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THE Airman

OFFICIAL JOURNAL OF THE AIR FORCE

General Caldara discusses Nuclear Safety—page 2

The Honorable Dudley C. Sharp,

former Under Secretary of the Air Force, was appointed new Secretary of the Air Force on Dec. 11, 1959. He replaces the Honorable James H. Douglas who became Deputy Secretary of Defense last December.

Mr. Sharp, a Texas businessman, has devoted four years to service in top level Air Force positions. From October, 1955, to January, 1959, he was Assistant Secretary of the Air Force for Materiel.

The new Secretary served in various capacities as executive and commanding officer of antisubmarine vessels with the U. S. Navy during World War II.

Born in Houston, Tex., Secretary Sharp is 54. He graduated from Princeton University in 1928.

THE Airman

OFFICIAL JOURNAL OF THE AIR FORCE

Volume IV, Number 3 March 1960

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THE AIRMAN is primarily a medium for the exchange of ideas and information among Air Force personnel. Readers are encouraged to submit articles, short subjects, photographs, and artwork. All contributions will be given consideration; suggestions and criticisms are welcomed. Opinions expressed by individual contributors do not necessarily reflect the official viewpoint of the Department of the Air Force. All photographs are official USAF photos unless otherwise designated.

Use of funds for printing this publication approved by the Secretary of the Air Force and the Director of the Bureau of the Budget July 5, 1956.

LETTERS TO THE EDITOR

Reunion

Sir: World War II members of the 376th Fighter Squadron, 362d Fighter Group, are planning their first reunion for this coming summer. Former members who may be interested in attending should contact "Argue," c/o Chuck Mann, 786 Baltic St., Memphis 12, Tenn.

Charles Mann
Memphis, Tenn.

★ ★ ★

Cap-Chur Guns

Sir: Could you please provide more details about the use of the Cap-Chur guns referred to in *Airman's World* (Nov. '59)?

Capt. James Huba
APO 845, New York, N. Y.

Sir: We are most interested in your item concerning the use of Cap-Chur guns in Alaska. Are such guns available for issue?

Maj. Omer Headrick
APO 113, New York, N. Y.

● *These guns are available through normal supply channels and are authorized for official use at all air bases.*

★ ★ ★

Isolated Duty

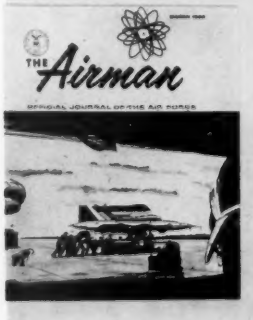
Sir: I have just competed *Isolated Duty—Curse or Blessing?* (Nov. '59). I certainly don't question the examples used by Lieutenant Sheehan in the article, but we here at Johnston Island feel that our station is also among the "most" isolated.

A/2C Vincent Sescoe
APO 105, San Francisco, Calif.

● *And we agree! Of course, it was impossible to mention* all *isolated duty bases in the article. A few readily recognizable names were selected as examples.*

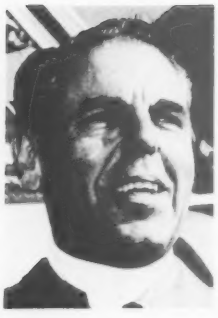
(Continued on page 30)

★ ★ ★



Front Cover: *Hound Dog* missile being readied for installation on a B-52.

Safety is a Science



by Maj. Gen. Joseph D. Caldara
Deputy Inspector General for Safety, USAF

In the years immediately ahead, more and more airmen will become familiar with the varied uses of nuclear energy. The Air Force Directorate of Nuclear Safety Research is already engaged in designing the environment of safety necessary for effective and rewarding application of scientific advances.

AIR FORCE interest in the employment of nuclear energy can be traced back to December 2, 1942, when Professor A. Compton in Chicago transmitted a cryptic message to Dr. Vannevar Bush in Washington, D. C. "The Italian navigator has landed," said the message. "The natives are friendly."

Translated from the secret language of the historic Manhattan Project the words meant that in a hidden laboratory under Stagg Stadium at the University of Chicago man had achieved the first self-sustaining atomic chain reaction, thereby initiating the controlled release of nuclear energy. Less than three years later, two atomic bombs dropped on Hiroshima and Nagasaki put an end to World War II.

Although the bombs dropped on Japan in 1945 were the only two in existence at the time—and the designers were not completely certain they would perform as intended—tremendous strides have been made in unlocking the secrets of the atom during the ensuing 14 years. In experiments conducted at sea and ashore the United States has exploded 129 nuclear devices, ranging in size from those producing a modest yield of three kilotons in the Nevada tests to the massive blast of the hydrogen bomb with an explosive force of 15,000 kilotons at the Pacific Proving Grounds.

As a result of the extensive effort devoted to the study of nuclear energy in military and civilian research centers, the Air Force is now equipped with manned and unmanned weapon systems designed to apply scientific achievement to the vital task of preserving the peace.

It is notable that in all our experience with atomic weapons—crowded by the urgency of circumstances into a too-brief period of time—the Air Force has never encountered an accident involving the unintentional detonation of any nuclear device. In the transportation and storage of special weapons, in dozens of training exercises, and even in unfortunate accidents which have occurred, not one person has been actively endangered by the distinctive explosive force or the emission of harmful rays characteristic of nuclear weapons.

This remarkable record—unparalleled in any previous radical advancement in weaponry—can be attributed to the emphasis on safety maintained by the Air Force and supporting agencies since the earliest days

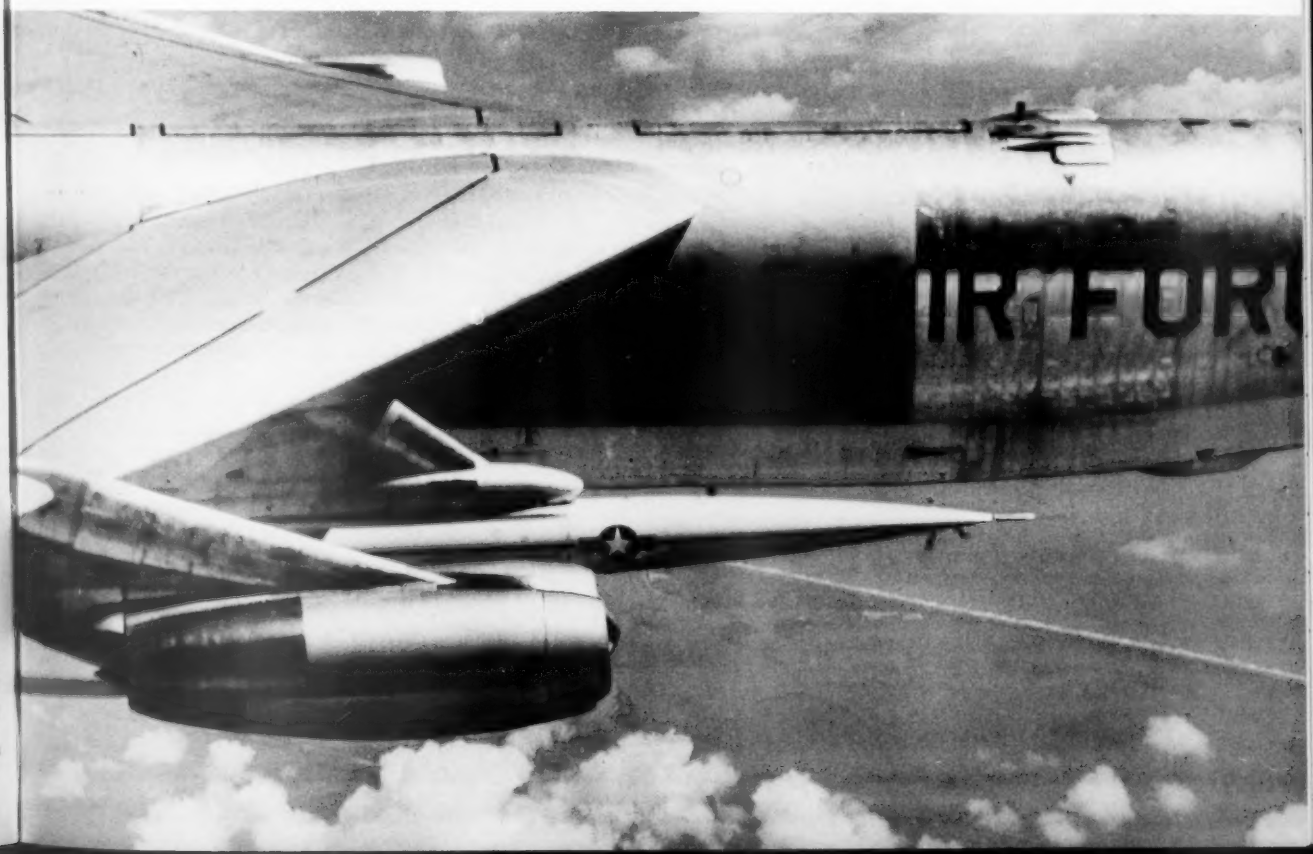
of the atomic era. The special weapons which now enhance operational capability so significantly have always been identified with particularly grave and inexorable obligations.

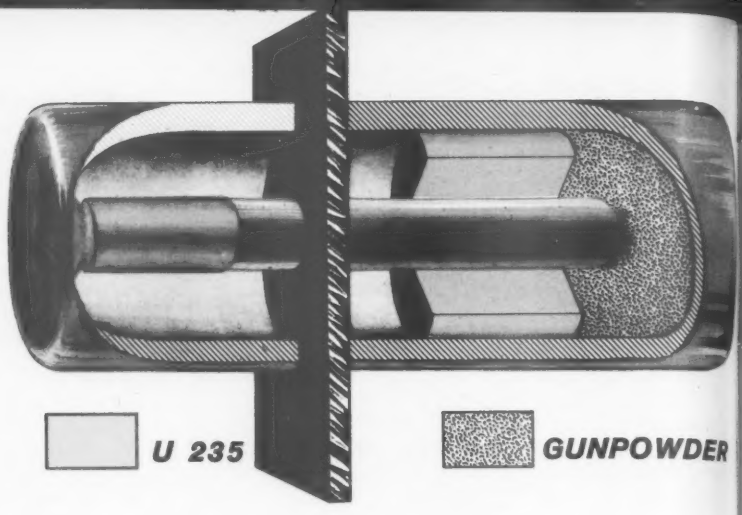
Nuclear safety within the Air Force is one of the responsibilities of the Office of the Deputy Inspector General for Safety, along with Ground Safety and Flight and Missile Safety. Field functions in the area of nuclear safety are carried out by the Directorate of Nuclear Safety Research (DNSR) located at Kirtland AFB, N. M. The creation of this directorate in August 1959 as a nuclear safety agency serving the entire Air Force is a logical consequence following the general transition of special weapons from developmental stages to operational status. Safety requirements and the need for nuclear safety education are expanded as operational commitments become more widespread.

Kirtland AFB has been the traditional focal point of Air Force special weapons research and development since 1946, and is particularly suited geographically as a center for collection and dissemination of knowledge concerning nuclear safety. ARDC's Special Weapons Center, responsible for development and testing of special weapons, is located at Kirtland. Adjacent is Sandia Base, home of Sandia Corporation, developer of hardware for nuclear weapons, and the field command of the Defense Atomic Support Agency. Just 70 miles to the north lies AEC's Los Alamos Scientific Laboratory, one of the two laboratories responsible for the development of atomic weapons.

The mission of the Directorate of Nuclear Safety Research is to develop and monitor safety standards, policies, and procedures governing all utilization of nuclear energy in the Air Force, whether for weapon systems, electric power generating plants, or propulsion systems for manned aircraft or missiles. The nuclear powered aircraft can be expected to enter the picture in the not-too-distant future, and DNSR will be faced with the task of insuring appropriate safeguards for everyone concerned with the operation. Nuclear power plants for generating electricity at remote sites are already programmed for the immediate future, and responsibilities for safety education in this direction can be expected to multiply and grow. In the meantime the directorate is primarily concerned with surrounding the entire environment of special weapons with complete and foolproof safety procedures.

The task of developing safety rules for any weapon system involving the use of atomic warheads is complicated by a variety of factors. Many of the accepted safety practices governing conventional explosives and aircraft have been developed as a result of experience over an extended time. Mishap or accident followed





THIS DRAWING *illustrates how unintentional detonation of the "gun gadget" device can be prevented by insertion of an effective shield between the component propelled by the gunpowder charge and the target element at the opposite end of the axle.*

by correction of the cause contributed a good deal to the traditional framework of safety practices. But the technical revolution of nuclear energy has altered the scope, dimension, strategy, and techniques of military operations more radically than any event in history. Basic historical concepts continue to merit full consideration, but each factor must be re-examined in the light of possible new implications in developing a safety program containing no latitude whatsoever for trial and error.

One of the most useful and important instruments available to the Directorate of Nuclear Safety Research is the Nuclear Weapon Systems Safety Group (NWSSG). NWSSG is a study-group system originally organized under ARDC to monitor the evolution of nuclear safety procedures in parallel with weapon system development. The NWSSG function now comes under the supervision of the Directorate of Nuclear Safety Research, with the director of NSR serving as chairman of the group.

The safety group is comprised of officer members representing the operational commands, SAC, TAC, and ADC, as well as AMC, ATC, and the Defense Atomic Support Agency and the Atomic Energy Commission. In some cases, when a particular weapon system under study is programmed for immediate commitment to an overseas command, PACAF, USAFE, or AAC may be invited to appoint representatives. All military members of NWSSG are selected for this special assignment on the basis of demonstrated maturity of judgment and knowledge of operational problems incident to the employment of special weapons.

The Director of Nuclear Safety Research, as chairman of NWSSG, directs the attention of the group to new weapon systems as early as possible in the development stages. A preliminary study begins by assembling all information on the system and its components from the interested agencies of ARDC, the weapon system project officer, the Atomic Energy Commission, and civilian contracting companies involved. This information is consolidated, collated, and analyzed over a period of weeks before the opinions of the members are formalized into an official position on necessary safety requirements.

The purpose of this preliminary study is to identify potential safety hazards or unusual command and control procedures which may be required so that the contractor and the sponsoring military agency may correct deficiencies during weapon development.

This preliminary study is followed by a second pre-operational examination as the weapon system advances toward operational readiness. The report of this study, which must be completed 60 days prior to operational availability, is processed to Headquarters, USAF, for coordination by the Air Staff, and for final approval by the Joint Chiefs of Staff, the Department of Defense, and the Atomic Energy Commission. From these studies emerge the safety policies which will govern utilization of the system.

Separate Entity

Each weapon system subjected to this study process is considered as a separate entity; the warhead and its characteristics are scrutinized in the framework of the entire environment that will be necessary to support it, including the type of aircraft or missile intended to deliver it on target. The scope of examination extends through the entire sequence from stockpile to target, and each new application of the weapon or major modification of an existing system entails a new and separate study process. Thus, although the B-52 aircraft has been in operational use for a number of years as a component of other weapon systems, a complete study of the B-52/*Hound Dog* package was completed in October 1959. Several systems may be under study simultaneously, with the *Atlas, Titan,* F-104C, and F-105B among the roster of weapons recently covered.

In addition to the studies conducted by NWSSG, the Directorate of Nuclear Safety Research institutes a post-operational inspection of each nuclear weapon sys-

tem one year after it has been introduced into the operational inventory. The purpose of this survey is to determine the adequacy of standards established previously and to evaluate experience gained. Difficulties—or potential areas of difficulty—are analyzed so that standards and procedures may be modified as required. Special surveys are carried out from time to time to establish the source of trends in minor malfunctions of support hardware or deviations from prescribed practices.

Under recent changes of AFRs 123-6 and 123-9 safety inspections of special weapons are now conducted simultaneously with operational readiness tests, with the report and follow-up speeded by electrical transmission. This provides a realistic picture of safety practices under conditions resembling combat.

Gun Gadgets

Earlier types of atomic weapons were relatively primitive mechanisms based on what designers referred to as the "gun gadget." The basic principle of the simple fission bomb consists of building up a highly supercritical mass of fissionable material in such a short time that the nuclear energy liberation that starts at the beginning of the assembly process does not develop to any important degree before the assembly is completed. This can be done by quickly inserting one piece of subcritical material into another piece of subcritical material. (See drawing.) When the material is completely assembled there is sufficient mass present to enable the reaction process to attain explosive force. In order to carry out the assembly process at the required speed it is necessary to shoot the component pieces into position with explosive power, using a charge of conventional propellant.

The principal safeguard required in the case of this simple mechanism consists in inserting a shield between the component pieces of subcritical fissionable material of such strength that accidental detonation of the powder charge would not result in assembly of the supercritical mass. This, of course, must be accompanied by the development of some positive sequence of actions to remove the shield at the proper time, thus arming the weapon.

Modern special weapons are much more sophisticated than this simple illustration; safeguards are considerably more elaborate, but in all cases the processes required to attain firing position must not be so complicated as to constitute an impediment to efficient operation.

Wiring down and sealing a toggle switch in an aircraft seems like a reasonable precaution against accident. But it is necessary at the same time to examine the circumstances under which the seal is to be broken. If the switch is intended to be freed with the fingers, the task must be within the capability of fingers.

The goal of establishing standards of safety for nuclear weapons is to arrive at a balance providing maximum protection against accident while retaining an optimum degree of efficient readiness in a combat situation. This approach is extended into every corner of the weapon system environment to include storage, transportation, loading operations, emergency situations, and jettisoning procedures.

Importance of Education

A safety program that is all anchor and no sail places restrictions on operational capability that could conceivably be disastrous. On the other hand, responsibilities in the area of nuclear safety are exceedingly grave. We are bound to do our utmost to safeguard human life and property. Furthermore, the position of the United States in the eyes of the rest of the world could be seriously impaired by anything but the most sober analysis of nuclear safety.

These factors point up the importance of education and leadership in creating and maintaining safety discipline in all activities associated with nuclear energy. The work of engineers, analysts, and human-factors specialists is aimed at attaining the balance between safety and capability. But this balance can be maintained without impairment to either element only as the determinations of the experts are applied to the work habits of the people at the operating end of the

Illustration by A/3C Billy Brinkley

instrument. Safety education, in other words, must reach every individual whose duties impinge in any way on employment of the weapon system. Therefore education will play an ever-increasing part in the functions of the Directorate of Nuclear Safety Research.

In addition to concern with the safety factors involved in existing weapon systems, the Directorate of Nuclear Safety Research keeps one analytical eye on the future by maintaining close liaison with those agencies of the Atomic Energy Commission and the Air Force engaged in the development of nuclear-powered aircraft and propulsion systems for other vehicles. A number of studies now under way have already produced sufficient data to bring many safety problems into recognizable focus. A number of earlier misconceptions regarding the hazards involved have been dissipated.

The employment of nuclear-propelled aircraft offers many advantages over conventional systems. Controlled nuclear heat as a source of power will make it unnecessary to carry large quantities of fuel or to refuel in flight. The range of such aircraft will be virtually unlimited. Other apparent advantages include unrestricted low-altitude and omni-directional target approach. But introduction of the new craft will bring the challenge of new safety procedures and we are now preparing to meet this challenge.

Physiological and psychological problems demand particular attention in developing a safety program for nuclear-powered aircraft. It is expected that duration of flights will be limited only by the endurance of crew members and continued emphasis must be directed toward the selection of well-adjusted, experienced, and knowledgeable people. The effects of confinement, boredom, and fatigue must be considered as factors affecting safety. The Air Force has already developed mock-up crew compartments of the type envisioned for operational use to study reactions under stress. No problems have been found which appear insurmountable, but the assortment of minor difficulties in combination dictates the need for continuing study.

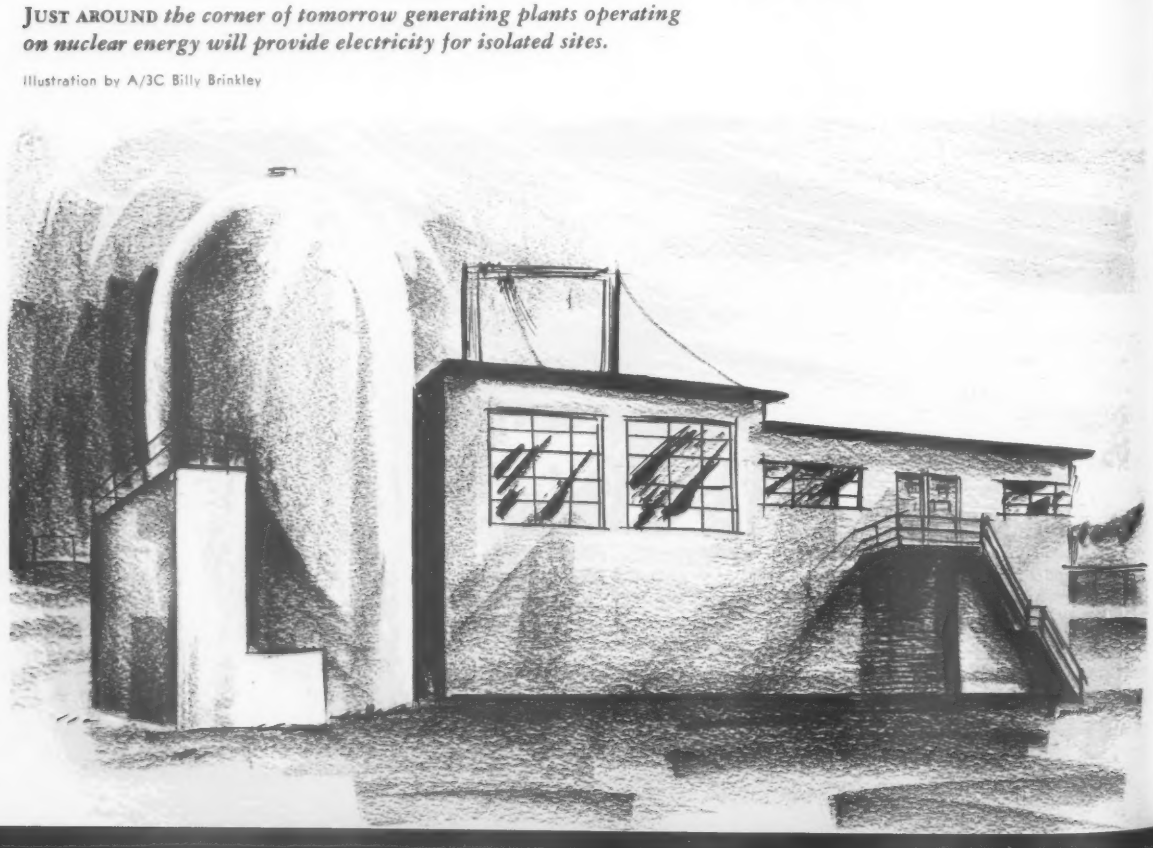
Aircrew and ground support personnel will be subjected to the nuclear environment as a matter of routine. Safety procedures now being devised for the age of nuclear propulsion provide that no person in any category will be exposed to more radiation than is now considered acceptable for workers in nuclear industry.

Bases will necessarily be equipped with a detection system to measure radiation at various points and relay information to a central monitoring station. Remote maintenance facilities will be required so that radioactive components can be removed for maintenance in specially constructed "hot shops." Ground support vehicles will contain advanced safety features incorporated in their design, including shielding, measuring devices, and air conditioning.

A great deal of progress has been made in dispelling the once-popular misconception that everything connected with nuclear energy is liable to blow up or react in some mysterious, unknown fashion, without warning. But none of the respect for its identifiable hazards has been lost. Nuclear energy, like gasoline, gunpowder, or any other source of power, is potentially dangerous. Only by forging an armor of realistic safeguards, and teaching our people how to wear it can we stay safe and stay strong.

JUST AROUND ***the corner of tomorrow generating plants operating on nuclear energy will provide electricity for isolated sites.***

Illustration by A/3C Billy Brinkley



How the Air Force Finance Center rushes your allotment checks and manages Air Force money.

Dealers in Dollars

by Capt. James D. Kent, *AFAFC*

Breaking barriers which have been long-standing bugaboos in military fiscal thinking, the Air Force Accounting and Finance Center in Denver, Colo., works on the philosophy that if it's been done this way very long, there's probably a better way to do it.

Some of the recent actions predicated on this concept give an extra boost to the Air Force as an organization while many help the airman and his family. For example, after years of deep-grounded "can't-do-it," the Air Force has developed a system for sorting allotment checks geographically by machine for mailing, thus speeding "green card" delivery to a half-million families and at the same time cutting overall government postal costs by a half-million dollars. The Center was the first government agency—civilian or military—to provide "mailmen" with this service, which has since been adopted by others.

Although the allotment check business is only a small part of the Center's job, it is probably the most familiar to most airmen and officers.

Did you ever notice the signature on your wife's check? R. P. Muhlbach.

Col. Robert P. Muhlbach, former head of the Army-Air Force Postal Service and now chief of the Allotment and Retired Pay Division at the Center, "signs" over one billion dollars in checks each year—enough to make a stack a mile and a half high.

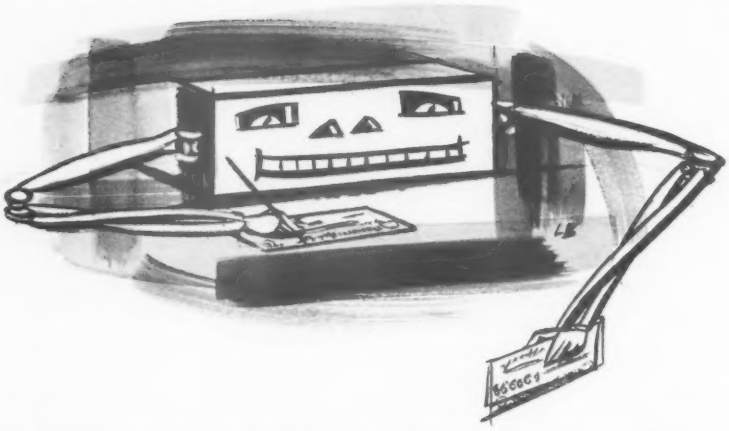
Most of these checks represent your own money: allotments to your families, banks, and insurance companies. The Center also pays about $20 million a month for income taxes withheld from your pay and another $8 million for Social Security.

Approximately 150,000 changes are made in allotment checks each month—25,000 changes of address alone. Most of these changes are made before the actual check-writing starts near the end of the month. Late arrivals, caught in the last four days after the checks are run, cause another 5,000 green cards to be "pulled" from the big vault during that period and re-addressed or changed. Then on the day before the last day of each month, the checks are wrapped, boxed, bagged, and tagged with the city of destination. Promptly at five o'clock they are loaded on post office trucks and delivered direct to the railroad station or Denver's Stapleton Airport. Until the Center found the way to machine-sort the checks, they went to the post office where each of the 700,000 were sorted by hand by an overtime shift of extra workers.

Once the checks are gone, it's too late to change the address on your wife's check; and judging from the letters received at the Center she must be hard to live with until that bill-payer arrives. So when you move, have her rush a change-of-address card to the Center immediately. It means quicker service to her and lower overhead to the Air Force. And be sure it includes your name and service number.

Colonel Muhlbach's people also determine whether wives or parents are entitled to a Government allotment. Normally wives are no problem—as far as the Center is concerned anyway. Marriage certificates are all the proof needed to begin allotments. But as for parents, the law says that they must depend on you for over one half of their support. That involves affidavits, investigations, and certain certificates.

Divorces and separations cause some concern, too. One disillusioned airman sent in his wife's wedding



ring as solid-gold "proof" that she no longer was entitled to an allotment from him. It was returned with a request for less interesting but more acceptable evidence.

Only once has one of the Center's business machines gone haywire. It wrote a check for 20 million dollars instead of 20 dollars as it was told. Technicians explained that static electricity built up in its "brain" had caused the error. The machines have since had all numbers over $999.99 filed off so that no check can now be machine-written for more than that amount—thus destroying one slim chance for a lifetime of luxury.

About mid-1960, the Center plans on installing an automatic data-processing system which will further speed the entire allotment and retired pay job, as well as other Center systems.

The Center is taking a positive approach to establish a system-wide quality examination program to eliminate errors before they are made and to determine what is actually needed in the line of account-keeping. To the extent procedures can be simplified across the board, the Air Force can save millions in accounting costs as well as reduce the petty annoyance, or genuine hardship, caused by overpayments.

Center officials point out, however, that overpayments last year totaled only 1/4000 of one percent of the military payroll—not a bad record for a system involving tens of millions of transactions at hundreds of bases under scores of laws and regulations affecting the payments.

Concurrently with this "look see" at procedures, another group is studying the "products" of the fiscal system in terms of their continued usefulness and timeliness, as well as obvious duplication.

The Center and the Strategic Air Command are mutually testing a "common purpose" Pay Card Accounting Machine input to the Air Force Accounting and Finance Center. At SAC's Lincoln Air Force Base, line items of payment and collection information in lieu of printed schedules and reports as presently received would be transmitted to the Center by the transceiver network. This would enable the Center to provide more prompt dollar information in its reports.

These reports contain information gleaned from the annual Air Force budget of nearly 18 billion dollars, for whom and for what the dollars are earmarked, and when and where every dollar is spent. From this galaxy of figures the Center supplies financial and budgetary information to Headquarters USAF, the Department of Defense, the Congress, Treasury Department, General Accounting Office, and other Government agencies, including a report to the Agriculture Department on how much surplus milk the Air Force drank.

In addition to this paperwork, the worldwide accounting and finance system is constantly under scrutiny by AFAFC personnel to see where something can be speeded, eliminated, simplified, or improved, so that it can serve aerospace power more effectively.

Playing a key role in this study are 18 noncommissioned officers who have served in important accounting and finance posts throughout the world, all currently assigned to the Center.

MSgt. Eugene Kupferer, formerly of Reese Air Force Base, Air Training Command, was the first airman to be assigned to duty at the Center. He's a systems accountant, considers his present work a real challenge, and believes that he can contribute to better communication between the AFAFC and the field on accounting and finance problems.

Another Center airman is SMSgt. W. B. Rudolph, formerly of Burtonwood AB, England, who is assigned to the Reports Improvement and Development Section of the AFAFC Central Accounting Division. Sergeant Rudolph believes his (AFAFC) duty is giving him a balanced fiscal experience so that when he does return to the field, he will be able to do a much better job.

Energized by Brig. Gen. E. J. Hopkins, a business management specialist of long experience, the Air Force Accounting and Finance Center is the only installation of its kind in the Air Force. Its officers, airmen, and civilians are dealers in the tax dollars of the American people and are imbued with the knowledge that these dollars support aerospace power. And the way they are managed can mean losses or gains in combat capability.

Black powder cartridges start B-57s which fly like high-altitude clay pigeons for antiaircraft missilemen.

They Root for the Army

by SMSgt. Harold F. "Jim" Roth
Hq, Twelfth Air Force

If anyone wonders how a duck might feel when he spots a gun barrel poking up out of a blind, pilots of the 1st Tow Target Squadron at Biggs AFB, Tex., might oblige by describing the sensation with first-hand accuracy.

As a matter of everyday routine, pilots of the "First Tow," commanded by Lt. Col. James H. Upchurch, fly their B-57 *Canberra* bombers over prescribed routes to provide flying targets for *Nike-Hercules* missiles launched by soldier-students at the Army Air Defense School, Fort Bliss, Tex.

Actually the term "tow target squadron" is a misnomer, a relic of World War II air defense techniques when prop-driven aircraft towed target sleeves or banners for antiaircraft gun crews. But the methods of the 1940s are faraway outmoded—both in the air and on the ground—and today's missile crews propel their antiaircraft warheads at a radar target invisible to the human eye except as a blob of light on the screen.

The radar beam which picks up the jet aircraft at heights near the foothills of space is offset by about five miles so that the launch crew can direct fire at an actual target on their instruments, while aircraft and crew are comfortably out of danger.

According to the established procedure, there is no real hazard for the aircraft, but at 40,000 feet the explosion of a warhead five miles away can have the appearance of being awfully close.

"It can get plenty scary up there at times" says Maj. Jack M. Smith, operations officer for the squadron. "Capt. Donald D. Klein was up there recently when something went haywire with a missile after launching. The range officer immediately ordered destruction, but the pilot had no way of knowing where the faulty shot might be. He had no choice but to fly the prescribed route. When the thing blasted, it was about a mile away."

As a change of pace from playing clay pigeon for the Army's missilemen, 1st Tow Target flies high-speed sorties over 4th and 6th Army Areas to test the proficiency of ground radar tracking stations. Electronic countermeasures missions add interest to these assessments of air defense capabilities when the B-57s dispense strips of aluminum foil from tank-like pods under the wings to confound and confuse the radar screens and their watchers.

In spite of the fact that the tasks of the 1st Tow Target are sometimes touched with the odor of danger, the unit has chalked up 20,499 accident-free flying hours in 33 months. And as for teamwork with the Army, the important job of polishing air defense techniques has produced a neat illustration of true service unification.

Nobody roots more sincerely or enthusiastically for the accuracy of Army missilemen than the pilots who fly to give them something to shoot at.

The 55/45 Air

by TSgt. John K. O'Doherty *Airman Staff*

"The forces which shape our military requirements in this generation, and the social, economic, and technical foundations upon which the military structure must stand, are ever changing. To employ our resources effectively, the composition of the force must be adapted to the realities that exist."

TRUMAN H. LANDON, Lt. Gen. USAF, DSC/Personnel

FISCAL YEAR 1961 will bring the first stages of a new personnel management concept intended to develop what has already been dubbed "The 55/45 Air Force." The program's ultimate goal—to be attained over an extended period—is a stable enlisted personnel structure composed of 55% professional career airmen and 45% first-term enlistees.

Already familiar to most are some of the component features of the program: *quality control, selective recruiting,* and *stringent reenlistment criteria.* But for many career men—particularly those who remember the years when PUSH FOR REENLISTMENTS was the all-encompassing slogan—there is an element of mystery about the magic numbers 55/45. If stabilization is accepted as a worthwhile goal—and who can reasonably quarrel with that—why not shoot for a highly professional force of 70% career men to 30% newcomers, or even a 65/35 ratio which is reasonably close to the present proportion?

The 55/45 plan is the outgrowth of nearly two years of study by the Budget and Programs Branch of DCS/Personnel, USAF. It is based on three inseparable factors: *anticipated skill requirements imposed by future technological advancements; enlistment and reenlistment habits of airmen; and manpower and money ceilings ordained by law.* The administrative instruments fashioned to implement the plan are based on the overall doctrine of selective retention—keystone of the 55/45 personnel structure.

Although selective retention is a comparative newcomer to the family of Air Force personnel problems, its ultimate, inevitable appearance was seen in the cards by personnel specialists as far back as Korea. Their vision is reflected in the succession of orderly modifications in personnel policies over the years leading up to the threshold of 55/45.

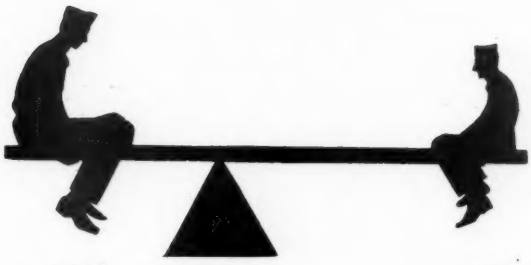
After fighting broke out in Korea in 1950, the Air Force—like the other military services—expanded very rapidly. Procurement was relatively simple as the impetus of the Universal Military Training law impelled young men to recruiting offices. But reenlistment rates were exceedingly low, and even by 1954 only one airman in every four was a professional career man. The military manpower problem of that period, reduced to its simplest terms, was one of *quality* rather than *quantity*. The main concern was not so much with the number of people on board, but the generally inadequate level of competence, skill, and experience.

Turning Point

This particular point in history—the early 1950s—marked the beginning of a tremendous technological advancement which has continued unabated to the present. New weapon systems employing nuclear energy, electronic controls and supersonic aircraft increased the requirement for technical skills throughout the Air Force. Yet at the same time, the accelerating imperatives calling for similar skills in civilian industry—and the limitations of existing legislative controls—frustrated any attempt to pull the personnel problem out of the mire by its bootstraps. The particular year 1954 might be described as the nadir of Air Force manpower progression—but it also marked a turn in the road.

The Career Incentive Act of 1955 brought an increase in pay, and the reenlistment rate among first-term airmen began to creep slowly up from the all-time low of 14%. In 1956 a study group popularly known as the Cordiner Committee was appointed to examine the personnel problems of all the services with a view toward identifying the motivation and incentives necessary for the evolution of a balanced, professionally skilled force for as long in the indefinite future as circumstances might require.

The committee's report, published in 1957, pointed out among other things that not only was the reenlistment rate too low, but it suffered from severe imbalance. The need was demonstrated, for example, for a 146% improvement in the electronics occupational fields.



55% CAREER AIRMEN

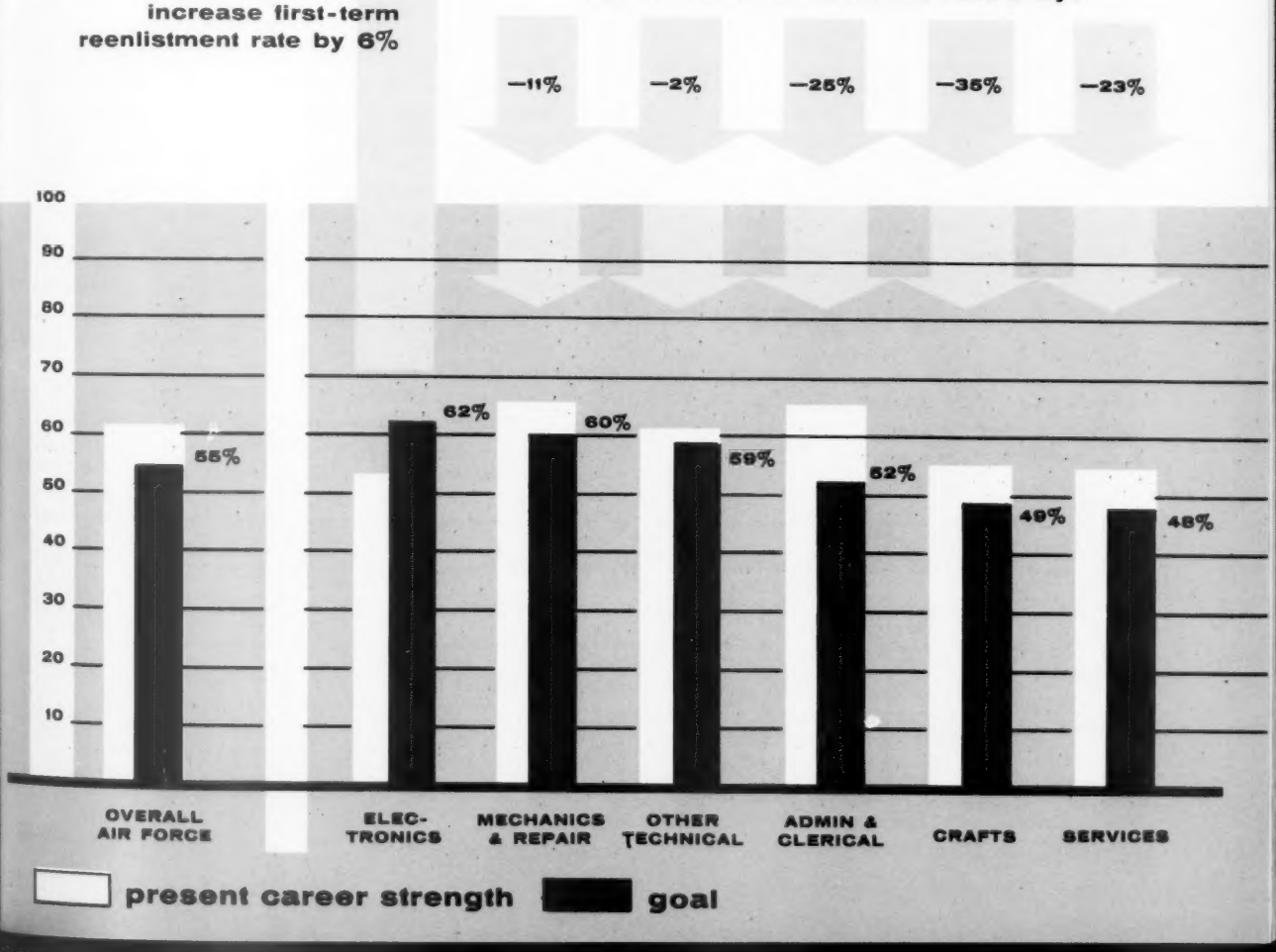
45% FIRST-TERM AIRMEN

GOALS of OPTIMUM AIRMAN CAREER PLAN

COMPARISON WITH FORCE AS OF 30 JUNE 1959

Electronics must increase first-term reenlistment rate by 6%

Stringent controls must reduce first term reenlistment rates by:



Stemming in part from the Cordiner Report, a number of important new benefits accrued to enlisted personnel from 1957 forward. These included increased compensation, more housing, medicare, survivors' benefits, the two super grades, and, most recently, the Military Pay Act of 1958. Concurrently, while these improvements were emerging from the mill of Congress, the Air Force inaugurated a number of internal policies aimed at providing increased career incentives. Enhancement of NCO prestige, Dependents' Assistance Centers, improved recreational facilities, in-service educational opportunities, and career counseling all played a part in building the vital, incorporeal complex of motivation.

By May of 1958 the relationship of career airmen to first-termers had undergone a remarkable adjustment. Instead of only one professional in every four, the two categories were running neck and neck. At the end of Fiscal Year 1959 more than 60% of enlisted personnel were career people, and indications pointed to a continuation of the upward trend.

Stability vs. Stagnation

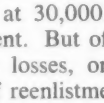
This extraordinary reversal in the pattern of reenlistments was far from being an unmixed blessing. For one thing, as reenlistments improved, the Air Force was stricken by the great plague of the "freeze." Because strength in the noncommissioned officer grades is limited to a rigid, inflexible proportion by the Department of Defense, the number of available promotions declined rapidly from 1955 forward, with 1959 earning dubious distinction as the worst year in Air Force history. The problem of imbalance in career fields—even under the slow erosion process of "freeze, unfreeze, then freeze again"—remained to muddy up the water of orderly progress.

In planning for the optimum career force under this arrangement of circumstances, it is necessary first to distinguish between stability and stagnation. The capacity to keep pace indefinitely with technological advances and changes in techniques must be continuing and enduring. To sustain this capacity, the force must be viable and contain a measure of internal flexibility. Thus each year there must be an influx of a new generation of airmen moving from first-term status into the career force. Each new generation must have the skills or the potential needed by the Air Force at that particular point in time. But to insure this orderly acquisition of required skills, a reasonable prospect of earning regular promotions must exist. This factor—the sustaining element—is of major importance in determining the ratio of career to noncareer in the optimum force.

On the basis of the present pattern of reenlistment habits, a 70% career force could become a reality in the next two years without the imposition of controls. But examine the conditions that would prevail in such a force and learn why controls are necessary.

Under the manpower ceiling of 710,000 airmen overall, the 70% force would be comprised of 497,000 career men and only 213,000 first termers. Losses from the 497,000-man career element can be calculated at 30,000 annually from normal attrition and retirement. But of the 213,000 first termers after predictable losses, only 48,000 will reach the four-year point of reenlistment annually. Thus 30,000 vacancies must be filled from a pool of 48,000 possible candi-

Promotion Possibilities



This chart reflects the average time an airman would spend in service to reach the indicated grades under the three different career force structures. Manning requirements by career fields naturally vary promotion chances for airmen but 55/45 will help eliminate frozen fields and stabilize promotion cycles.

Time to make	A/3C	A/2C	A/1C	SSgt.	TSgt.	MSgt.	SMSgt.	CMSgt.
EXISTING 62/38	3 mo	1 yr 8 mo	5 yr 7 mo	13 yr	18 yr 9 mo	23 yr 4 mo	26 yr 3 mo	28 yr 7 mo
PLANNED 55/45	2 mo	1 yr 5 mo	3 yr 10 mo	11 yr 7 mo	17 yr 11 mo	22 yr 9 mo	25 yr 11 mo	28 yr 5 mo
FUTURE* 70/30	4 mo	2 yr 2 mo	7 yr 5 mo	14 yr 3 mo	19 yr 5 mo	23 yr 11 mo	26 yr 7 mo	28 yr 8 mo

** Force structure that would have developed without new controls.*

dates, imposing an overall reenlistment requirement of 64%. This requirement, moreover, becomes even more formidable when broken down into the balance composition by career fields. Manning criteria require, for example, that the electronics field in a 70% career force be 79% career manned. This imposes the obviously unattainable goal of a 98% reenlistment rate in the electronics career fields. Such a situation could only worsen as the number of losses through retirement begins to mount in the years ahead.

Another drawback to this 70% force is the effect on promotions. Although an increase in the ceiling on noncommissioned officers is a future possibility, under present criteria it would take a man seven years and five months to make airman first class in these circumstances. This can scarcely be regarded as attractive to a young man making a decision as to his career. Based on these factors alone—and there are others of equal import—the 70% career force obviously is revealed as a stagnant structure which cannot be sustained as an effective organization.

Examination of the projected 55/45 structure places the same factors cited above in a much more favorable light, and offers considerably greater opportunity for conservation of funds. In the 55/45 organization, under the same manpower ceiling of 710,000 men, the relationship is—in round figures—390,000 career men to 320,000 first termers. Since the erosive forces of attrition and retirement are in this case working against a smaller professional group, the annual requirement for replacements in the career element will be 24,000, instead of the 30,000 necessary for the 70% force. Because of the larger pool of first-term airmen in the sustaining element, some 73,000 men can be expected to reach the four-year point of first reenlistment annually. Thus, in this case there are 73,000 men to fill 24,000 vacancies, as opposed to 48,000 for 30,000 vacancies in the 70% structure. The 55/45 force, then calls for an overall reenlistment rate among first-termers of 33%.

Judged by the contemporary reenlistment pattern, this overall rate is readily attainable; the imbalance in available skills can be predicted, and the relatively modest deficiencies anticipated in technical areas can be overcome by retraining from allied fields or increasing pro pay, etc. Since 70% of all jobs in the Air Force are in the five and seven skill levels, the principal operational difference between the two forces—70% versus 55%—is that in the latter more of the five-level jobs will be filled by first-term airmen.

In comparing the two with respect to promotion opportunities, the difference is significant. In the balanced 55/45 force the elapsed time from original enlistment to attainment of the rank of airman first class is expected to be three years and ten months.

From the standpoint of financial cost, the difference between the two forces is equally dramatic. The number of dependents associated with the 55/45 force can be calculated at 1,047,000. In the 70% force this figure would be 1,263,000, or an increase of 216,000 people—more than the entire population of Norfolk, Va. or Syracuse, N. Y. The cost of travel, housing, commissaries, and hospital facilities is only a part of the expense of maintaining dependents, and it has been estimated that the difference between the two forces will result in a saving of a billion dollars a year for longevity, retirement pay, and cost of dependents' benefits.

In approaching the task of streamlining the career force to fit the new dimension, Air Force personnel policy tends to lean heavily on normal attrition. No requirement for drastic surgery is immediately indicated. Voluntary, non-disability retirements progressively increasing over the next several years will whittle a slice from the upper layer. Current habit patterns show that about 30% of all those eligible will retire promptly upon reaching 20 years, with the remainder following in more or less equal groups through the years up to 30. In addition to this there is a normal loss of about 15% who drop out after 10 years, and another 5% who leave after 16 years.

The most promising and important instrument in the plan, however, is the program of *Selective Retention,* aimed at restricting indiscriminate transition from first-term to career status at the end of the initial hitch. The time-honored requirement of keeping the nose clean and reporting promptly to the recruiting office at the end of four years is no longer acceptable as a basis for embarking on an Air Force career. More stringent screening at the four-year barricade will restrict reenlistments to those showing aptitude in their specialties, and only in the numbers required to sustain the career force at the established level. For some time the power of decision was largely in the hands of the individual; reenlistment in the future will be arranged on a basis of individual ability matched with Air Force requirements.

In the days to come, reenlistment quotas will become as large a part of the personnel picture as promotion quotas, and competition among first-term airmen for up-coming vacancies will unquestionably improve the bloodstrain. At the same time the Air Force will be in a position to offer increased opportunity for promotion and professional advancement to careerists. The numbers 55/45 mark an important milestone in the evolution of enduring, professional aerospace power.

"Shorty" was nearly blind and he couldn't be sure the blurred image below was McCook Field. Landing the Le Pere biplane would bring death or fame to

The Man with the Frozen Eyeballs

by TSgt. Harold L. Craven, *Airman Staff*

In 1917 and 1918 it was fashionable for advanced flying students—those who had soloed—to tell adventurous lies to newly-assigned pilot trainees. According to one of these lies an Air Service pilot lost control of his airplane at a high altitude and descended so rapidly that his eyeballs froze. They miraculously thawed in time for him to recover from his fall less than 100 feet above the runway and land safely.

Shortly after the war, in 1920, Maj. Rudolph "Shorty" Schroeder had a true adventure that was similar to the legend of the frozen eyeballs.

Schroeder was chief test pilot at the Air Service Engineering Laboratory at McCook Field, Dayton, Ohio. He had recently lost the world altitude record to Roland Rohlfs who had taken a Curtiss triplane to 32,450 feet above Garden City, N. Y. He wanted to regain the record and his assignment to the task of testing an automatic oxygen regulator and a Moss supercharger, installed on a Le Pere-Liberty 400 biplane, provided an opportunity.

On February 6 the major got the Le Pere to an indicated 30,000 feet, then blacked out when the oxygen regulator failed due to the extreme low temperatures encountered. He fell to 18,000 feet.

The oxygen regulator was modified and Schroeder tried again on February 26. This time he took along an additional supply of oxygen, a small bottle with a hose attached. The supercharger performed efficiently, as it had on the previous flight, and the airplane climbed like a mountain goat. At 18,000 feet the oxygen regulator froze and the major had to rely on the spare bottle. He hoped it would hold out until the airplane reached a record altitude. He climbed to 25,000 feet where he encountered a strong west-to-east wind that he estimated at 175 miles-per-hour. This was not a new experience. He had run into this river of air before at high altitudes, always moving in the same direction at 150 miles per hour or faster.

He continued climbing. At 30,000 feet indicated strut temperature was minus 67 degrees and the engine exhaust became visible, forming a long white cloud in an otherwise cloudless sky. Ice formed on the struts wherever the exhaust fumes touched them and the major noted wisps of the visible fumes blowing past his head. He wondered how much exhaust gas he had breathed. At 36,000 feet indicated, when he estimated his true altitude to be about 33,000 feet, the oxygen supply expired. He continued climbing as long as possible. Just before losing consciousness he removed his ice-covered goggles and felt a sharp pain in his eyes. He reached for the twin-ignition Liberty's two switches, managed to cut only one of them, then passed out.

The biplane fell like a shot duck, its engine operating at full speed. The pilot regained consciousness, heard the screaming of wind through the struts, opened his eyes, and saw nothing. Despite his blindness he recovered control of the airplane. He guessed his altitude as somewhere around 20,000 feet, believing that the air density at that altitude would be sufficient to revive him. Partial vision soon returned; Schroeder could see the instruments and found the plane in a shallow climb. He was shocked to note the altimeter registering just below 3,000 feet. He began looking for landmarks but could not focus his eyes on anything more distant than the instrument panel. He could distinguish between ground and sky but was unable to positively identify any part of the terrain below. An area ahead and to the right looked like a blurred outline of Wilbur Wright Field, but he couldn't be certain. Gambling that it was, Schroeder set a compass course in what he believed was the direction of McCook Field.

A slight improvement of vision, coupled with extreme pain, extended his focusing range to the wingtips. Shapes on the ground were less vague now, but still too blurred for positive identification. He picked a spot that had the general configuration of McCook Field. At any rate, it was approximately where the field would be if he had properly identified Wilbur Wright Field. He overflew it, did a 180-degree turn, and retarded the throttle. As the plane glided toward the area he alternately looked at the blurred image of the ground and the sharper image of his altimeter. Visual determination of distance was impossible and he expected that this would be one landing he wouldn't walk away from. The ground was closer now. He eased back slightly on the stick, reached for the ignition switches, and felt a slight bump as the wheels touched down. Someone yelled "Nice landing, Shorty!"

Schroeder was taken to the hospital. He was informed that an unofficial check of the recording instruments on the Le Pere indicated that he had, indeed, set a new altitude record. The Bureau of Standards made it official a few days later. He had climbed to 33,113 feet, 663 feet higher than Rohlfs.

Medical officials diagnosed the major's blindness as a result of chilling combined with the effects of carbon monoxide poisoning, and assured him that he would regain full vision within a few days. Prior to his release from the hospital he made several predictions regarding aviation that caused his fellow patients to wonder if he had not lost touch with reality. For example, he told them that commercial use of superchargers would soon permit heavy passenger airplanes to cross the highest mountains and fly over thunderstorms at tremendous speeds.

"These airplanes will have sealed passenger cabins which will be equipped with cabin superchargers," he said, "to keep air densities and temperatures at levels that will be comfortable, or nearly so, at all altitudes.

"In the future," he added, "passenger airplanes will be able to cross the continent on schedule, more rapidly than the fastest passenger train."

Art of Official Respiration

In 1934 a mixture of liquid oxygen and liquid air formed a rich breathing atmosphere for three Air Corps aeronauts aboard the stratosphere balloon *Explorer*. The balloonists breathed comfortably even at their maximum height, 60,613 feet.

Despite this successful flight the Air Corps continued using bottles of compressed oxygen gas. Liquid oxygen, due to its extremely low temperature of minus 297 degrees, was difficult to generate, store, and handle. World War II airmen flew their missions knowing that a well-placed enemy hit could explode an oxygen bottle with sufficient violence to destroy an airplane and its crew.

Eventually many of the problems were worked out. In 1952 several F-84G *Thunderjets* equipped with liquid oxygen converters were purchased. Others followed, and eventually the Air Force converted all its combat aircraft to liquid oxygen. The new systems resulted in weight and space savings of 60 to 80 percent over the oxygen gas systems previously used. Reduction in weight and size resulted in improved aircraft design and helped greatly to bring about the impressive performance of today's combat airplanes.

Weight and size of components is more critical in the design of space vehicles than in the design of machines built to operate within the Earth's atmosphere. Liquid oxygen, which played an important role a quarter century ago in the exploration of the stratosphere, may also play a highly important part in man's conquest of space.

—TSgt. HAL CRAVEN

Air Force Marksmanship Comes of Age

Collegiate football isn't the only sport where airmen recently hit the big time.

In the 1959 National Rifle and Pistol Championship Matches at Camp Perry, Ohio, the USAF "Blue" .22 caliber pistol team defeated 229 seasoned teams representing some of the finest military and civilian shooters in the country.

At recent state, National Rifle Association, regional, interservice, and national matches, Air Force rifle and pistol shots copped individual and team matches, walked off with many *Marksman, Sharpshooter, Expert,* and *Master* class championships.

Since TSgt. William H. Mellon became the first member of the Air Force to score 2,600 points in pistol competition, in May 1958, eight other airmen have earned membership in the exclusive "2600 Club" which lists less than 70 members throughout the U. S.

In the Second Annual Interservice Pistol Championship at Lackland AFB, Tex., last month Air Force marksmen tested their skill against the best Army, Navy, Marine Corps, and Coast Guard pistol shots. The airmen gave a good account of themselves.

The reason? The small arms proficiency program, started two years ago to improve the shooting ability of USAF personnel, is beginning to show results.

"More important than class championships," says Col. Peter W. Agnell, Chief of Air Force Marksmanship Training, "is the fact that shooting ability has improved considerably among our airmen. It is especially noticeable among those who carry arms in performance of their duty. Provost Marshal law enforcement and security personnel, combat crews, and OSI agents must now qualify at much higher standards."

In the small arms training now a part of the curriculum at the Air Force Academy, cadets must qualify with small arms and annually demonstrate the prescribed degree of shooting proficiency.

To add incentive to the program the Air Force created its own distinctive *Excellence-in-Competition* and *Distinguished Rifleman* or *Pistol Shot* badges. Like marksmanship badges issued by other services, they are recognized and respected by shooters everywhere. To earn a *Distinguished Rifleman* or *Pistol Shot* badge, an airman must win three *Excellence-in-Competition* badges, make the minimum qualifying score (AFR 50-20) and be among the top 10 percent in high-level competition on three different occasions.

Competition among shooters is encouraged. It enables commanders to evaluate the quality of the marksmanship instruction, provides incentive for an airman to improve his skill, and gives coaches and team officials additional training.

To keep pace with the expanding small arms proficiency program, the USAF Marksmanship School at

MSgt. G. A. Boley instructs USAFA Cadet Jules L. Viquesney on Air Force Academy's small bore rifle and pistol range.

Lackland is being steadily improved. Two years ago it was little more than a converted dining hall. Today it boasts one of the finest 100-position outdoor pistol ranges in the country. A 50-position, 50-meter international type pistol range, adaptable to FBI-type practical courses of fire, will be added in the near future.

The school also has a 100-position, 50- and 100-yard small bore rifle range. An additional 140 positions, to be built soon, will provide 240 100-yard targets suitable for .30 caliber firing. Both the carbine and .22 caliber rifle are used in the marksmanship training of basic airmen at Lackland. A 50-position, 300-meter international high-power rifle range will be constructed at Camp Bullis which adjoins the school's 50-position, 200-, 300-, 600-, and 1,000-yard range.

Since the first class began training in November '58, a new group has entered the school every month. Trainees, selected for their interest and proficiency in shooting, are given a comprehensive 12-week course that leads to the Marksmanship Instructor AFSC. After graduation each man returns to his home base to start a local small arms program and stimulate interest in shooting. Result: an Air Force-wide interest in shooting and improved marksmanship at every base.

The USAF Small Arms Proficiency Program was designed to restore the competency with firearms traditionally considered one of the military profession's primary skills. Is it doing this?

Colonel Agnell says "Yes. We've made good progress in our first two years of operation, but still have a long way to go before airmen meet the high standards of proficiency we've outlined for them. Teaching the Air Force to shoot is a job that requires time, training, and money. If the program does nothing more than improve the marksmanship of one airman assigned to guard a missile, fighter, or bomber base, or improves one downed airman's chance of survival, the effort and expense will be justified."

In the near future, more and more airmen will sport the coveted new badges that read: U. S. Air Force Distinguished Pistol Shot or U. S. Air Force Distinguished Rifleman. —DAVE KARTEN

Col. Peter W. Agnell, Chief of the Marksmanship Training Program at Hq USAF, congratulates USAF "Blue" team on winning High Standard Trophy, emblematic of 1959 National .22 Caliber Pistol Team Championship.

THE AIR FORCE

". . . I would dedicate this Nation
to the policy of the good neighbor."

F. D. ROOSEVELT
Inaugural address, 1933

by MSgt. Frank Clifford, *Hq, USAF*

THE language from the small radio was Spanish, but the phrasing, pauses, careful enunciation, and patient repetition of sentence fragments was pure old *Norte Americano* soap opera—Castilian soap, if you like, but soap opera.

Listening intently, sometimes repeating a phrase aloud, an Air Force master sergeant ignored the roar of a fighter being run up just outside his office on a Bolivian Air Force base situated hard on the west flank of the Andes.

"Yes, it's a soap opera," the sergeant said. "But this is one of the best ways I've found to sharpen my Spanish. I had six months of Spanish in the States before I came here, but this is a kind of post-grad course—nice and slow, none of that zippy newscaster stuff. Besides, I'm kinda cheating a little, because I've heard some of the programs in the States."

Cheating or not, the sergeant's purpose was serious and his language skill is an important part of his job as a member of an Air Force mission in Latin America.

To the *Latinos* he is a *Norte Americano;* specifically a resident of the *Estados Unidos,* and generally regarded as a pretty estimable fellow. In a word, he is a "*Yanqui,*" one of the hustling breed whose second language is technology and whose bouncy confidence would intimidate a hungry tiger.

He is one of a hand-picked team of some 219 Air Force officers and airmen who man our 15 air missions in Central and South America. They are among the ties which bind the vast awakening land south of the Rio Grande—ancient by *Norte Americano* standards—to the bustling giant in the North.

Of the 17 sovereign nations south of the Rio Grande, only Mexico, Costa Rica, and Panama have no missions at the present time. Also without missions, in the same general geographic area, are Cuba, where the first United States military mission was established in 1928, and the Dominican Republic.

Immediate control and direct supervision of the USAF missions to Latin America is one of the primary functions of Headquarters, Caribbean Air Command, which directs its far-flung interests from Albrook AFB, Canal Zone. Paradoxically, while CAirC is one of the smallest of the major commands, having about 1,500 officers and men, it has under its area of responsibility one of the greatest geographical expanses of all the major air commands.

The air missions system itself got its start in Latin America in 1926 when the U. S. Government, noting the increased tempo of British, French, German, and Italian interest in various Latin American countries, permitted American military services to extend technical assistance to those nations asking for it. Requests were not long in coming.

Yet even today European influence is still much in evidence throughout Latin America. Local troops in some countries march with only a slightly toned down version of the German "goose-step." In Columbia, instructors in ground force units still wear on the left sleeve at chevron-level, an emblem with a silhouette of a German steel helmet overlaid with a bayonet.

N LATIN AMERICA

Both the step and the emblem are leftovers from German missions which dotted Latin America between World Wars I and II.

Norte Americano influence and methods are now erasing the technical and administrative traces of other military systems. But the enormity of the task, the small numbers of mission personnel assigned, and the fact that some Latin American air forces must be entirely rebuilt in machinery and manpower are obstacles which impede rapid progress. Further, national pride, based on Old World values, and nurtured over the centuries, is a reality that must be taken into constant consideration when instruction or advice is indicated. A pre-emptory "Do it this way," a thoughtless word or gesture, can easily set the stage for progressive misunderstanding. Mission members learn quickly that some things just "aren't done or said." *Latinos,* for their part, are just as careful to respect the customs of the *Yanquis.*

A perennial source of misunderstanding has been the use by air missions of enlisted instructors and technicians. Yet as the *Latinos* come to understand that NCO instructors are a regular part of the USAF technical school program the feeling that military rank has been slighted begins to diminish. Here tact and diplomacy play their part; the rough hand and sharp tongue are subdued to conform with local custom.

Make Haste Slowly

To make sweeping changes in long established administrative and technical procedures overnight is almost impossible. Mission officers do not expect their efforts to result in immediate changes. Col. Phil B. Cage, commandant of the Latin American School at Albrook AFB, Canal Zone, an Air Force operated technical training school for officers and men of Latin American countries, expressed the general feeling when he said: "This is a long-range program and we don't expect any real results in less than four or five years, with the real payoff coming perhaps in 15 years."

Signs of change are evident, though, even in the sedate gait of the formal Spanish language. At a supply base in a west coast South American country a high ranking officer whose family tree has roots centuries deep in Latin America, entered a staff session to explain a new mission-inspired procedure. He winked at his American colleague and said: "Hey, Jose, let's really shake these jokers up."

The "slanguage" was picked up by the officer as a natural byproduct of several lengthy stays in the U. S. where he had attended technical schools and the Air University Command and Staff College.

Progress, though slow, is steady. El Salvador, Chile, Peru and Ecuador have adopted the USAF personnel management system in general. Chile in fact, has gone a step further by installing the Air Force classification system as completely as local conditions of manpower and equipment permit. Other countries have done so too, but in a more limited way.

This is a considerable step toward tightening up manpower control. Until recently, accurate strength rosters were not only rare, but in some countries were

not regarded as being particularly important. This line of reasoning is beginning to melt before the instruction and example of the *Norte Americanos*.

The same is true of two other basics required for effective airpower—maintenance and supply. Both of these areas pose considerable problems involving equipment, procedure, and human nature.

A mission warehousing supervisor pointed out a trait that seems to be inherent in supply men of all military forces from the time of the Caesars and before: "They seem to think that once something is entrusted to their care, that's the end of it. It's theirs and they intend to keep it safely locked up."

Aircraft maintenance is complicated by the wide variety and mixed nationality of aircraft. In Latin American air forces are such U. S. aircraft as: T-6; T-33; T-34; F-47; F-51; F-86; F-80; B-25; B-26; B-57; C-47; C-54; C-123; and PBY amphibians.

Other aircraft, almost exclusively British, include: *Meteors, Vampires, Venoms, Canberras,* and *Hawker Hunters*. Flightlines also display operational JU-52s, the Luftwaffe's primary WW II paratrooper transport.

Standardization of equipment is one of the chief aims of every mission in Latin America. The objectives are obvious—reduction of training requirements and increased operational capability through readily available replacement parts.

No Typical "Mission"

Because of the varying requirements of each host nation, there is no such thing as a typical air mission. Each is tailored to meet the specific needs of a particular nation's air force. Thus, one mission might have a preponderance of supply and maintenance experts and few communications technicians, while the mission in a neighboring country might have a structure heavy in specialists of totally different skills and trades.

The 5500th Foreign Mission Squadron, Albrook AFB, C.Z. is the parent organization of all air missions in Latin America. Detachment 7 at Port-Au-Prince, Haiti, is unique, however. Four officers and four airmen carry out their duties in an atmosphere reminiscent of New Orleans. Here the dominant language is French, a distinction which sets this unit apart from its Spanish-speaking neighbors.

Air missions, like other American military missions, are in foreign countries upon the specific invitation of the host nation. Following such a request, accompanied by an exchange of notes at the State Department level, an agreement is reached between the United States and the Latin American government concerned.

By this agreement a USAF mission is established. Spelled out in the pact are such points as: purpose and duration of the mission; composition of personnel; duties, rank, and precedence; privileges and immunities; and composition and prerequisites.

In a sense, Air Force members assigned to mission duty are under contract to, and work for, the host nation's air force as military advisors or instructors. Depending on the arrangement mission members may be responsible to the Air Minister, to the Minister of Defense, or to the host country's Air Force chief.

In pure point of fact mission personnel are under rather tight legal restrictions as spelled out in the mission agreement. However, this is a two-way street. While mission members are required to do certain things according to the agreement, the host nation also has clearly defined obligations to fulfill.

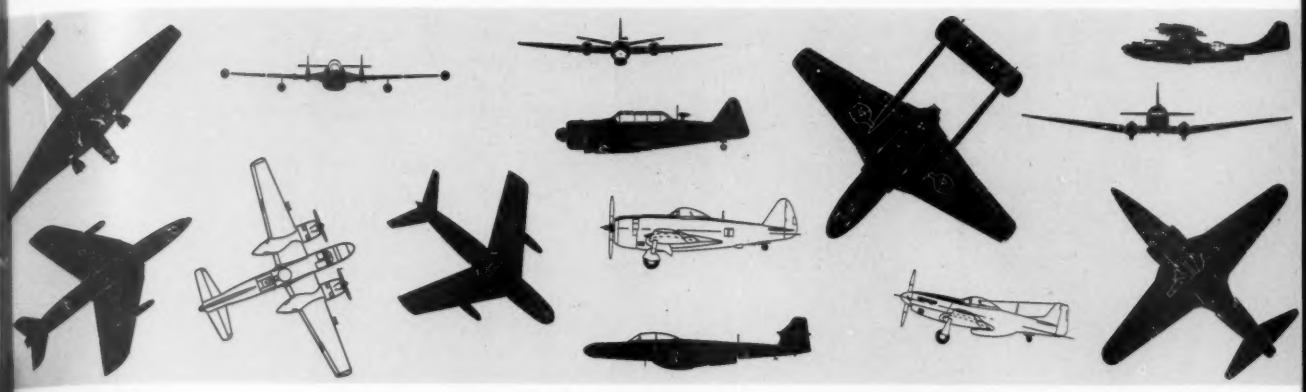
A mission member planning to go on leave, for example, must first obtain approval of his local commander and the host Air Force chief. In actual practice this is normally a formality and seldom has anyone ever had a leave denied under this provision, but it is in the agreement and can be brought in play at will.

Instruction by NCOs is informal.

At this point it might be well to explain the differences between air missions and Military Assistance Advisory Groups (MAAG) and air attachés. Quickly removed from discussion are the air attachés, which function as part of the official family of the American ambassador in a host country. Except in a neighborly way, they are not connected to either the USAF missions or to the MAAGs.

Compared to MAAGs two prominent differences come quickly to the fore. Air missions are continuing, long-range programs; MAAGs are short-term ventures, designed mainly to introduce new equipment, assist in specialized training, and to provide an easy opportunity to buy American weapons and equipment needed to fulfill specific hemispheric defense needs. All costs are borne by the United States.

The United States, having entered into mutual assistance agreements in accordance with the U. S. Mutual



Security Act of 1954, presently maintains a MAAG in six Latin American countries; however, since 1956 the MAAGs have been maintained at zero strength and the function has been assigned as an additional responsibility to the Air Force mission.

The six missions in Latin America that have the dual function of MAAG are: Brazil, Chile, Colombia, Ecuador, Peru, and Uruguay.

In the air mission system, salaries and allowances of mission members are paid by the U. S. Air Force, but the host nation in many instances pays for transportation to and from the United States. Until April 1, 1959, host nations paid individual mission members a stipend, commonly referred to as "Presidential Pay." The Mansfield Amendment to the Mutual Security Act of 1958 halted these payments to individuals and the money is now paid into the Treasury of the United States.

Varied Duties

The professional interest of the typical air mission is as broad as the host nation desires it to be. On the wall to the left of his desk, Col. Donald R. Conard, commander of the 22-man air mission at Lima, Peru, has a chart which tells the story. The mission is studying ways to improve air-sea rescue techniques, establishment of a comprehensive OJT program, organization of a radio-relay system, a complete reorganization of the Peruvian Air Force's communication and electronics system, installation of a base telephone net, siting and installation of radar posts, establishment of an Air Force (Peruvian) officer education program, and the modernization of the flying training program.

All of these projects demand expert knowledge. It is available among the ten officers and 12 NCOs who make up Detachment 12. An inventory of the skills to be found in Detachment 12 includes experts in air operations, education and training, communications and electronics, aircraft maintenance, personnel, supply, and administration, all at the staff officer level.

Backing up these positions are the NCOs with parallel skills and long years of experience.

On occasion a special task requested by the host government is beyond the capability of the resident air mission staff. Such was the case when it was decided to enlarge the communications net of the Peruvian Air Force. A call went out to the Caribbean Air Command for a technician capable of undertaking the job. Almost by return mail, SMSgt. Armando A. Ibarra, 797th AACS, Panama, arrived on the scene, his considerable technical skill reinforced with a masterful command of Spanish.

As his six-month TDY tour was expiring his performance had so impressed the Commanding General of the *Fuerza Aerea del Peru* that he put in a bid to have Ibarra stay over for an additional year. Such performance of duty is a handsome feather in the Air Force's cap and it marks the great climb of *Americana* prestige in Latin America since the end of World War II when American military personnel working in the region were obliged to wear civilian clothing to avoid attracting unwelcome attention and comments.

When heavier training support is required, air mission chiefs make use of the Mobile Training Units (MTU) of Air Training Command. These are units of varying strength, depending on their specialty, staffed and equipped to carry their classrooms to any point in the world. Many of the units have made "repeat appearances" over the entire Latin American circuit.

All Volunteers

Individuals named to mission duty must meet some of the highest criteria for duty selection existing in the Air Force today. They are picked not only for demonstrated mastery of their Air Force specialty, but also for intangible qualities which indicate they will "wear well" among their Latin hosts and present the best possible view of the United States and the Air Force. All are volunteers.

Airmen are allowed to apply specifically for duty with a mission, a MAAG, or an air attaché unit. Officers, not permitted such latitude of choice, are restricted to application for attaché duty only.

Applicants' dossiers are carefully screened in the Pentagon. Those selected, a comparatively low percentage of all applicants, are interviewed in Washington and are tested for language aptitude. Language potential is measured by the Psi-Lambda test developed by Harvard University.

Language training is a mandatory requirement for all selectees. Those going to missions in Latin America attend a six-month course in Spanish in either of two contract schools in Washington, D. C.—the Foreign Service Institute and the Sanz School of Languages. The courses are intensive, concentrating on conversational Spanish but including some training in grammar and vocabulary.

While the student is in school, his background data are sent to the country of assignment. There, local authorities determine his acceptability. The host nation has the right to accept or reject all candidates, but in actual practice acceptance is almost automatic. However, no one leaves the U. S. for a mission unless acceptance is received.

Life on Mission Duty

Family housing in Latin America could be better. In rare cases, especially in the nations south of Panama where a cyclone of construction has raged since the end of World War II, architectural styles are modern. American wives, regarded as the most finicky housekeepers in the world, find things to both complain about and rejoice in.

The abundance of domestic help, for example, enables "the Missus" to do a lot of things she wouldn't have time for elsewhere. Many of the wives learn the language and the social customs of the region; children of grade-school age learn the language as a matter of course and with no particular effort since many of them attend schools where only Spanish is spoken and English is a foreign tongue. The presence of non-English-speaking domestics in the house accelerates the process.

Only a small amount of supplies for mission families come from the commissary at Panama, flown in on a space-available basis aboard a Caribbean Air Command courier which makes one east coast and one west coast circuit each month. A fleet of four C-54s makes up the courier force which flies over some of the most rugged terrain in the world. In 1958 the courier fleet delivered some 687,700 tons of freight and passengers to destinations throughout Latin America.

Food is purchased on the local market. Supermarkets, totally undistinguishable from their *Norte Americano* counterparts, abound in a few of the larger cities of Latin America. In this familiar environment the *Americano* housewife not only has her choice of established "brand" merchandise she knew so well in the U. S. but also the best of the local food products, plus outstanding European food specialties.

Prices in the supermarkets range from a bit higher to quite a bit higher than Stateside prices for the same quality merchandise. Once they become familiar with the local scene the average *Americano* housewife steps away from the shelter of the supermarket in quest of bargains for her table. With the aid of a dependable maid she soon learns the ins and outs of the open markets, adding her voice to the babble quizzing the local merchant. "How are the tomatoes today?" is the same the world over. And so is the pious assurance that they are the best the store ever stocked.

On the mission sites the scene is both familiar and at the same time strange. Familiar is the Air Force uniform which is required wear during duty hours in almost all Latin American missions. Unfamiliar is the bi-lingual flavor of conversation where Spanish words and phrases are blended with English in single sentences. The aircraft and technical equipment are well-known, but the men working on them are in "foreign" uniforms and the status and maintenance charts are in a "foreign language." These differences quickly become less apparent as a mission member works into his job. The time soon comes when he feels nothing strange about his position but regards himself as part of "the outfit."

Then he concentrates on his specialty, passing on his knowledge, teaching and guiding, with the same conscientious devotion to duty he would display in a regular U. S. Air Force unit. After all, this is the fundamental reason why he is a mission member, and why the host government has expressed such trust and confidence in him. Always within easy recall is the knowledge that he is a member of the U. S. Air Force, that he is a mission member, and that his conduct will reflect on the U. S. Air Force and on the United States of America.

SLANTS ON SPACE

/// A full Moon, which floods the night with brilliance for groundlings, will seem a pallid light source to future astronauts who have the opportunity to compare it with the bright hemisphere of a "full" Earth. The Moon reflects a mere seven percent of the light it receives from the Sun whereas the Earth does at least four times better than that. Seen from the Moon's surface, Earthshine would appear even far stronger than the lunar variety for the simple reason that a hemisphere of our planet offers a reflective surface 13 times larger than the visible side of the Moon at that distance.

Best current estimates place the Earth's reflectivity at about 29 percent, although some references give 34 and even 45 percent. The reason for the disparity in estimates is that no precise measurement has been possible in the past by instruments located beyond the atmosphere. More exact data on the Earth's albedo—the scientific term for the ratio of light reflected from an unpolished surface to the total amount of light falling on it—will have to be developed by some future space vehicle.

Estimates of the Earth's albedo are based on the nature of our atmosphere and also on terrestrial surface features. The atmosphere is dense and through it move great cloud systems containing water droplets and ice crystals in suspension. Much of the surface is covered by bodies of fresh or salt water and there are the extensive polar ice masses, as well as the snow capped mountain chains. Water in any form is highly reflective.

Since the lunar atmosphere is too negligible to be an albedo factor, scientists are curious to learn the nature of the surface material which absorbs and retains all but a small part of the light energy it receives. Some isolated areas have been observed on the Moon which register albedoes as high as 30 to 40 percent, but the low reflectivity of most of the surface cuts the average to the seven percent figure. In contrast the seemingly dull rocks exposed on the Earth's surface have albedoes appreciably greater than a 10 percent average.

/ / /

/// If you have been puzzling whether *Project Midas*—the satellite early warning system—was named after the legendary ancient king whose touch turned things to gold, you can cease and desist. The designation is an acrostic, taken from the official label: *M*issile *D*efense *A*larm *S*ystem.

/ / /

/// The total weight of the atmospheric "shell" between the Earth's surface and true space is five quadrillion (5,000,000,000,000,000) tons. The method for computing the weight of air above our heads has been known since 1643 when the Italian physicist and mathematician, Evangelista Torricelli, hit on the principle with his invention of the mercurial barometer. Paradoxically, man still doesn't know what volume those five quadrillion tons occupy. Previous theories on the extent of the atmosphere went by the boards when artificial satellites began reporting that air particles were up to 40 percent more numerous at orbital altitudes where atmospheric density was erroneously believed to be thinning out.

/ / /

/// Solar batteries, currently in use to provide auxiliary power for satellite instruments, utilize only about 11 percent of the energy they receive from the Sun. It is estimated that as much as 50 percent of the solar light reaching the batteries' silicon wafers is reflected back into space. Another sizable percentage, representing the longer wave lengths, passes through without being converted to electricity.

/// It is estimated that it took a hurtling ball of nickel-iron more than 100 feet in diameter and weighing some 200,000 tons to produce Meteor Crater, near Canyon Diablo, Ariz. The crater is bowl-shaped, measuring some 4,000 feet across and rimmed by a parapet which varies from 148 to 223 feet in height above the flat surrounding plain. The bowl is 500 feet deep but is believed to have been originally from 100 to 300 feet deeper before debris from erosion built up its floor. The crater's age is placed at somewhere between 20,000 to 75,000 years. Diamonds of the carbonado variety have been found frequently in the tons of meteoritic material strewn in the crater's vicinity.

/ / /

/// Besides our own Moon there are 30 other natural satellites in the Solar System. Of these, 10 have what is called a retrograde motion, i.e., they move in a direction contrary to that in which all the other satellites or their planets are revolving and rotating. In the retrograde group are all five satellites of Uranus, the three outmost of the dozen moons orbiting around Jupiter, the outermost of Saturn's nine, and the inner of Neptune's two.

/ / /

/// Venus is often called the Earth's "sister planet" because its dimensions, mass, density, and several other important characteristics are close to similar. Venus, too, is our nearest planetary neighbor, approaching to 24,600,000 miles at its closest. Yet no scientific reference work devoted entirely to Venus existed in English until 1956 when the first such book appeared. Long before that date, however, the literature dealing with more remote Mars was voluminous.

—WILLIAM A. KINNEY

CHECK RIDE

If that elevator trim button on the wheel should fail to work, Colonel Wray must use flaps to control aircraft attitude, stay out of way of other airplanes in the sky.

by MSgt. Edison T. Blair, *Airman Staff*

ALL four throttles were full forward. The VC-137 (AF version of the Boeing 707) blasted smoothly down the runway and lifted off. But just as the 100 tons of airplane broke ground, a raucous horn blared an emergency warning. Only three throttles were forward now and the 13,000 pounds of thrust normally produced by number three engine had disappeared. After the first wobble, takeoff continued so smoothly that a passenger wouldn't have noticed.

Two hours later Lt. Col. Robert A. Wray would peel off his sweat-soaked gloves, gingerly pluck his wet flying suit from his body, run a hand through already mussed hair and announce:

"She's a real good airplane, but she's certainly not a forgiving one."

But now he was in the aircraft commander's "hot seat." From takeoff until landing he was to experience just about every emergency short of an actual crash that could happen in this, the world's fastest jet transport. The Air Force owns but three of these airplanes and they are used exclusively by the President and other Government executives. Wray commands the detachment of 1254th ATG pilots who operate them and he has to stay proficient. Today Maj. Jack Fancher, a veteran of multi-engine jet flying, sat in the right seat, created the emergencies, and checked the colonel's reactions.

Nothing else happened until they reached 20,000 feet then Major Fancher demonstrated the Dutch Roll—a yawing, sickening rolling motion that becomes increasingly violent in sweptwing aircraft in turbulent air. Time after time the colonel corrected the motion.

Speedbrakes, small metal flaps that spoil the lift on

"Let's have a smoke before shooting landings."

With spoilers up, Wray watched airspeed, braced for buffeting to come . . . Fancher watched for other airplanes.

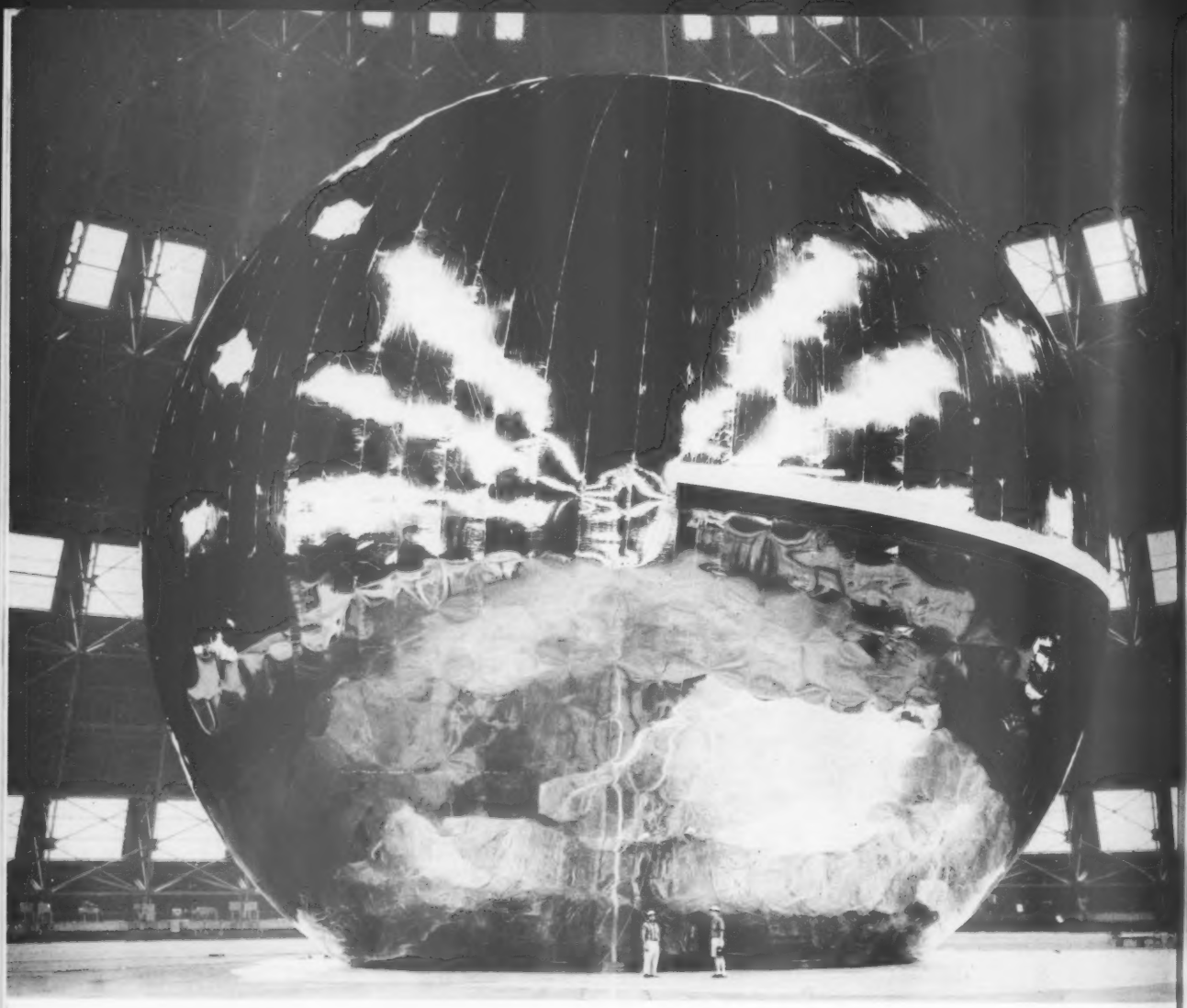
the wing, can slow the airplane and allow it to descend at a rate of 16,000 feet per minute if pressurization should fail at altitude. Controls are not as effective on this huge jet transport at slow speeds and if there's no power on one or more engines it is vital that the pilot recognizes the buffeting that precedes a stall. To know the minimum control speed he has to practice and learn his margin for error—if any—by approaching stall speed.

If all the power is lost on one wing it takes a full rudder quickly applied and some aileron to keep the aircraft flying straight and level. The rudder hook demonstration can be disconcerting and like anything else that goes with flying, it has to be practiced until reaction is automatic. The adjustable horizontal stabilizer might stick in one position; the split flaps peculiar to the Boeing VC-137 and 707 can be used to offset the effect and maintain the proper aircraft attitude.

It also takes practice to set a hundred tons of airplane moving at 127 knots per hour gently on a runway—especially on a ground controlled approach. The Air Force is real particular about the passengers that ride in its VC-137s and insists that pilots practice 'til they are perfect.

The engineer calls out reference speed.

A steady throttle hand responds to GCA operator's instructions.



STAY TUNED TO SPACE

by William A. Kinney, *Airman Staff*

The approach of spring finds a new space program in the making. Given good weather and the absence of mechanical gremlins, it might even get under way before the end of March. It represents the first step toward an objective which holds great gains for the country's prestige and every-day economy, as well as for essential military purposes.

Known as *Project Echo,* the undertaking is to launch a satellite as tall as a 10-story building into a thousand-mile orbit and use it for the passive relay of messages between ground stations in New Jersey and California. Commercial interest in how the experiment fares is quite keen because existing national and international telephone circuits are already heavily taxed and even heavier traffic will have to be handled in the future.

The schedule, as announced, calls for a total of three *Echo* shots to be fired under the supervision of NASA, utilizing the Air Force facilities at Cape Canaveral, Fla. The vehicle designated for the job is the *Thor Delta* which consists of the high-performance IRBM carrying two smaller rocket engines as upper stages.

The passive communications payload is an aluminized sphere, 100 feet in diameter but weighing only 150 pounds. This will be carried aloft folded in a 28-inch-wide container and inflated upon injection into orbit. The relatively light weight of the sphere for its

imposing size when inflated is explained by the fact that its skin is of mylar plastic, measuring a mere .0005 of an inch thick or about the same as the familiar cellophane of a cigarette package.

As orbiting altitude is attained, residual air in the satellite will start the sphere's inflation. Then a bag containing a liquid or solid chemical compound will be punctured within the sphere and in the near-vacuum at that height the compound will turn into vapor which, expanding, completes the inflation process. When fully inflated, the sphere's volume is 523,600 cubic feet.

Under space conditions some or all the gaseous molecules may be lost by seepage through microscopic openings in the mylar plastic skin. Collapse of the sphere would not result, however, because at orbital altitudes no exterior pressure exists to crush it. Micrometeorites of average size likewise pose no special threat since the minor perforations they would produce in the skin could have next to no effect on the relay's usefulness. Only a collision with a meteorite of substantial proportions would mean destruction.

Operation of the relay's inflation system already has been successfully demonstrated in tests conducted from NASA's experimental station on Wallops Island off the northern Virginia coast. The sphere was the same 100-foot size but the programmed inflation altitude was only a bit over 250 miles because of a lower powered launch system. However, in *Discoverer* series shots from Vandenberg the *Thor* has shown the capability of achieving a thousand-mile orbit and without a booster upper stage so no serious misgivings exist on that score.

Dozen Orbits Daily

Advance computations are that a successful *Echo* satellite will complete a swing through orbit in about 120 minutes, at least at the beginning.

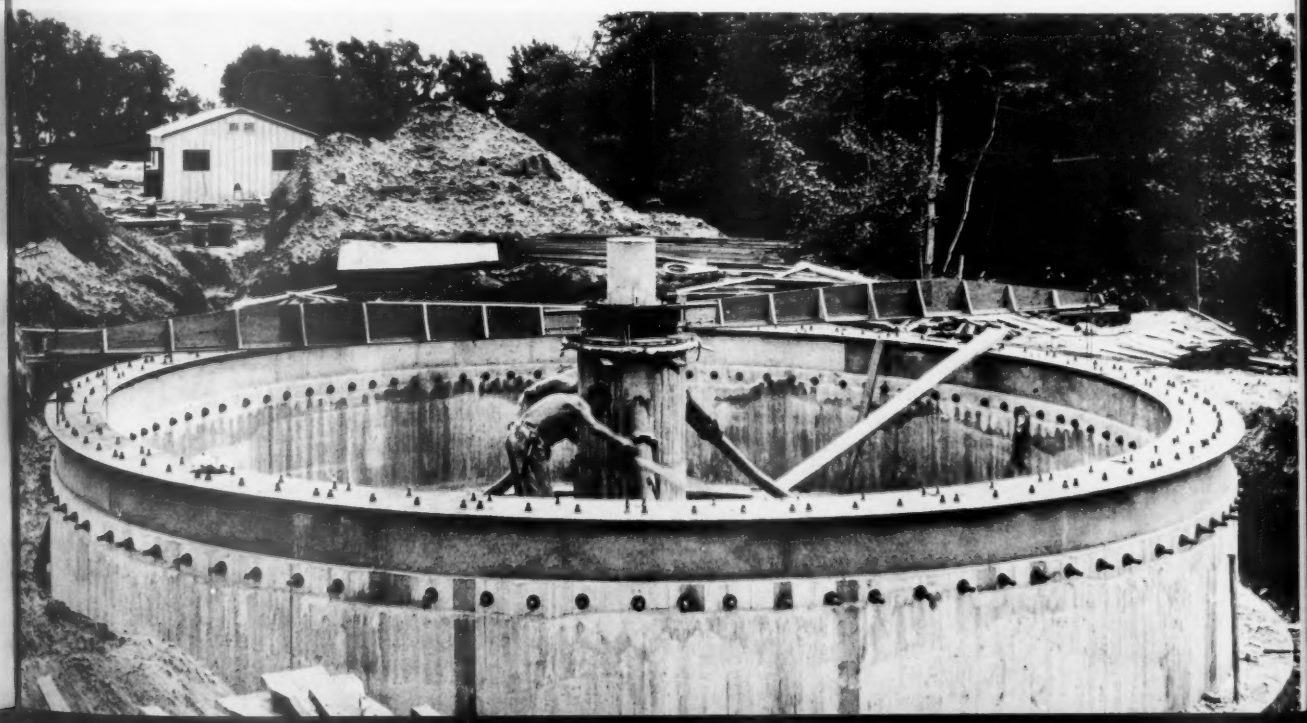
The orbital path selected inclines at an angle of some 50 degrees to the equator and launch is to be in a northeasterly direction. The trajectory pattern will take the device over all portions of the globe between 50 degrees north and 50 degrees south of the equator and in that wide zone lies most of the populated Earth.

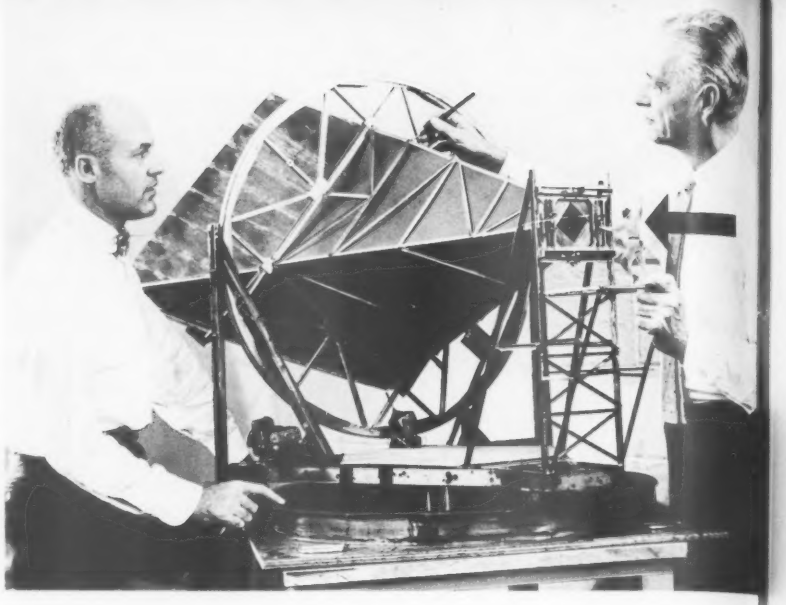
Visual observation should be facilitated by the high reflectivity of the sphere's aluminized surface. It is estimated that the satellite will have the relative brightness of Vega, a zero magnitude star, which may be easily seen with the naked eye. This would make the relay device appear approximately seven times brighter than the Pole Star, Polaris.

The two major installations primed to participate in

HAVING A BALL *as big as this in orbit is what Project Echo requires for its experiments in space relay of communications. An east and west coast station will alternately bounce messages off huge sphere's surface and then receive them. Two men are dwarfed in front of the 10-story high device.* *Photo from NASA*

CIRCULAR *concrete and metal foundation for Bell Telephone Laboratories' Project Echo listening post measures 30 feet across. On it the big horn antenna system can be rotated to intercept space-relayed messages. Photo shows base as construction of station progressed.* *Photo from Bell Telephone Laboratories*





SPACE AGE *"ear trumpet" at Holmdel, N. J., will look like this model greatly enlarged. The completed horn antenna measures about 50 feet long, with a listening aperture of 20 by 20 feet. Small figure at right of photo (arrow) shows how a six-foot man looks next to completed antenna.*

Photo from Bell Telephone Laboratories

the communications relay experiments are a Bell Telephone Laboratory at Holmdel, N. J., and NASA/Jet Propulsion Laboratory's Goldstone tracking station in southern California. They are 2,300 miles apart. Holmdel will use a 50-foot, dish-shaped antenna—specially constructed for the program—to bounce a beam of 960 megacycle signals off the satellite for interception by the 85-foot dish at Goldstone. In messages originating at the California station the transmission will be a 2390 megacycle signal. The longest time for "mutual visibility" of the satellite at the two stations is expected to be about 16 minutes in any one pass.

Holmdel offers good evidence of the experiment's potential value in the eyes of the communications industry. Bell laid out roughly 80 percent of the cost for the recently completed transmitter; NASA funded the remainder. The reason for marked commercial interest is not hard to understand.

A transcontinental telephone call today may require routing through more than 100 microwave relay towers, spaced at distances up to 80 miles apart. Once the feasibility of a satellite system has been proven, there is prospect of putting through a call by single relay via satellite. The passive relay of *Project Echo* could be replaced by active relay—that is, transponder satellites equipped to receive and relay a message immediately or to store it, then retransmit it upon signal when coming within range of the intended recipient ground station.

As for overseas communications, engineers point out that the newest Atlantic cables, which cost $40,000,000 each, can handle less than 160 calls simultaneously. It is estimated that relay satellites, orbiting at sufficient altitude, could relay over 900 calls simultaneously.

Another consideration of great importance in future intercontinental communications is the transmission of television programs. Existing Atlantic cables cannot accommodate a single TV channel. Because of the short band width, picture impulses must be cabled slow motion and then speeded up for rebroadcast purposes. An *Echo* satellite could relay one TV channel live.

Experiment Difficulties Seen

It would be misleading to leave the impression that *Project Echo* will afford anything like the optimum in experimental opportunities. The present state of the art and the boost capability of the launch vehicle impose sharp limitations. However, since the objective is only a feasibility study, experts are optimistic they will be able to develop fundamental data they seek.

One recognized shortcoming is introduced by the huge reflecting sphere. Its mass—or the amount of matter it contains—is negligible in comparison with the great size of its structure. As a result its orbital behavior will be much more affected by gravitational pull, drag, turbulence, temperature changes, and other natural forces which have disturbed the flight of previous satellites whose mass has been compactly packaged.

By way of a partial analogy, imagine a ping pong ball rolling along with a soap bubble floating immediately above it. A puff of wind sufficient to push the ball a little off course would send the bubble flying a much longer distance.

Disturbances in an artificial satellite's flight cause its orbital pattern to decay; the greater the disturbances, the faster the decay. In the case of this relay satellite, advance estimates are that its orbital life will be only a month or two.

Orbital decay raises another problem. Keeping track of a satellite becomes very difficult when is does not carry a radio beacon. The only good times for visual observation are the relatively short periods before sunrise and after sundown. Once the original orbit began deteriorating it would be necessary for radar to relocate

the relay device on each pass instead of having advance data of close accuracy as to the approximate coordinates where a more stable satellite would reappear.

A final handicap is that at the altitude of 1,000 miles the giant sphere can stay in sight of both Holmdel and Goldstone only a brief 16 minutes. However, communications specialists in this country and elsewhere in the world will be participating in the feasibility experiment on a volunteer basis and the data they develop should make a valuable supplement to that obtained by the Jersey and California stations.

Apart from its main purpose, *Project Echo* will afford scientists an unusual opportunity for further study of the natural forces which cause space vehicles to deviate from their normal flight pattern. While celestial mechanics can account satisfactorily for most of the orbital disturbances recorded to date there have been some for which positive explanations have yet to be established. The exaggerated effect of perturbing phenomena on the relay sphere may provide more information on existing areas of uncertainty.

Focus on Future Needs

Looking to the future, experts are agreed on two key points. A reliable communications satellite will have to be heavy enough to minimize the perturbing effects of natural forces on its orbit. And the altitude of that orbit will have to be substantially higher if the satellite is to remain visible from two distant ground stations for a good length of time.

At the altitude of 2,000 miles, for example, a satellite would have greater relay capability, yet its orbit would still pass close enough to earth to be gradually impaired by terrestrial attraction, drag encountered in the outer atmosphere, and other disturbing effects. Thus its usefulness would be shortlived and a replacement would have to be sent up before it ceased orbiting. Taking into account the factor of orbital variables, a global relay net at this altitude would probably require about 20 component satellites to have one always reasonably close to zenith for two distant surface points.

If the altitude is increased to 4,000 miles a satellite would be visible from about 25 percent of the surface below so theoretically a system of four should provide constant global coverage. Actually, five or more would be necessary, depending on the orbital precision attained by the satellites and the perturbation factor.

The ultimate system, as outlined in technical studies, would be three satellites at equidistant intervals 22,300 miles above the equator, orbiting in perfect circles and exactly in the equatorial plane. At such an altitude each satellite would be in view of more than half of the Earth and since they would be moving at the same velocity of our planet, they would appear to be fixed stationary above the surface points below them. It is conceded such a communications net would be extremely expensive to establish but the argument runs that the cost would be more than offset because the net would be longlived and no maintenance problem.

Whether this attractive paper concept can be transformed into a reality must be rated most unlikely for the foreseeable future and in all probability longer than that. The problems which must first be resolved are both numerous and formidable. Not the least of them is to program an orbit which makes a perfect circle—a type of ellipse which science hasn't found in the natural physical order.

Realistic estimates are that in any pioneering space communications system the component satellites will be deployed in orbits only a few thousand or so miles above the Earth. If encouraging results are forthcoming from the *Echo* feasibility experiment, engineers can start mapping work plans for creation of an initial operational net and decide on a tentative timetable. Once such an undertaking gets the green light, the country's unmatched know-how in the field of mass communications should accelerate progress.

Harnessing space for commercial and military communications would be a solid accomplishment of the highest order yet the feat would hardly stir and impress popular imaginations throughout the world the way spectacular deep probes or Moon shots have done. However, the system could also be exploited dramatically to further U. S. interests by relaying TV programs designed to keep the country's true image and spirit before the peoples of other lands, particularly those in the so-called uncommitted nations.

In the present competition for the minds and understanding of men, observers point out, much of the effort is directed at newly self-governing states where the literacy level is low. The old saying that one picture is worth more than ten thousand words still has high validity in such societies. Indeed, when educational levels began to rise in Western Europe several generations ago pictures were recognized as the most effective way to reach and interest adult beginners; "the books of the unlettered," they were called.

The scarcity or complete lack of TV receivers in economically undeveloped nations does not make the idea impractical, observers explain. Since our government now considers it advantageous to maintain U. S. Information Agency libraries and reading rooms even in countries where only a small percentage of the population have the schooling to use them, they say, obviously it would be more advantageous to reach a mass audience by supplying TV receivers for community use in main population centers or key regional areas. The magic of the medium is considered sufficient attraction to draw audiences from the neighboring countryside, just as in the American past farm families would travel goodly distances for the annual fair at the county seat or to the city to enjoy a theatrical presentation.

The great psychological potential of such a people-to-people program seems to have impressed, among others, Arthur C. Clarke, British astronomer and WW II RAF officer who is today one of the foremost writers on space science and related subjects. He comments:

"When we consider the impact of TV on our own ostensibly educated public, the impact on the peoples of Asia and Africa may be overwhelming. It may well determine whether Russian or English is the main language of the future."

MAAG Duty

Sir: I have just completed the article in *Airman's World* (Nov. '59) concerning MAAG duty. Could you please give me all available information on volunteering for such an assignment?

A/2C Joseph Martel
Loring AFB, Maine

● *Each application must be considered on its individual merit. Apply under Part II, Chapter 9 of AFM 35-11, but contact your personnel officer for complete information.*

★ ★ ★

MOH Comments

Sir: Your article *Attack on Wewak* (Nov. '59) brought back a lot of memories. I was a member of the 38th Bombardment Group during this period and the loss of Major Cheli was keenly felt in our organization. The Air Force has had few officers more heroic and gallant than this man.

MSgt. Herbert Swilling
APO 193, New York, N. Y.

Sir: I was most surprised at the apparent youth of Maj. Ralph Cheli in the photo which accompanied the article on the award of his Medal of Honor. Could you please tell me when it was taken, and his age when he was promoted to major?

A/3C Thomas Murphy
APO 84, New York, N. Y.

● *Although it is impossible to determine precisely when the photo of Major Cheli was taken, we know it was during his cadet days. He entered training in February, 1940, and was commissioned October 29, 1940—his 21st birthday. He was 23 when promoted to major (temporary), February 18, 1943, and died barely a year later on March 4, 1944.*

Sir: As a former member of the 93rd Bomb Group, I was most interested in your article *Priority Target* (Oct. '59). I think, however, you erred in placing Maj. John Jerstad in the 376th. He flew as copilot to Lt. Col. Addison Baker during the raid on Ploesti.

John Maher
Houston, Tex.

● *Reader Maher is correct. In the process of editorial research the major was inadvertently "transferred" to another organization.*

★ ★ ★

Correction

Sir: In the *You Ask It* column in the November 1959 issue, I think you made an error. You note that with regard to disability payments it is possible for "premium payments to be waived with reduction in the amount of protection." I think this should read without reduction."

MSgt. Robert Mintner
Maxwell AFB, Ala.

● *Sergeant Mintner is correct.*

★ ★ ★

Most Experienced

Sir: In your *Letters to the Editor* column (Nov. '59) you note that Mr. Lambert performed the first ejection jump in 1940. I think you will find the date was 1946.

MSgt. Henry Lacour
Tyndall AFB, Fla.

● *You're right. In 1946 CWO Lambert received the Cheney Award and a DFC for his ejection jump from a Northrop F-61* Black Widow *at Wright-Patterson AFB, Ohio.*

★ ★ ★

Exception

Sir: I was most impressed with your article *Is MATS Really Necessary?* (Nov. '59). However, I feel that a most important segment of MATS operations was overlooked—that of Air Evac.

Capt. Mary Tonne
Minneapolis, Minn.

● *The story of Air Evac was told in* Angels With Silver Wings, *Dec. 1958 issue.*

★ ★ ★

A Better Half

Sir: Sergeant Turner's article *Your Better Half* (Oct. '59) really hit the spot with me. Periodically, everyone should be reminded that the military and their dependents have a place in the community in which they are stationed.

Mrs. Billie Farmer
Casselberry, Fla.

★ ★ ★

Base of Choice

Sir: I recently received orders for an overseas assignment. Have the latest changes in personnel policies affected the selection of base of choice upon return as described in *Somebody's Gotta Go There* (Oct. '59)?

A/3C Clifford Bernard
Hunter AFB, Ga.

● *This policy is still in effect and there appear to be no plans to change it. However you should double check with your personnel officer prior to rotation.*

★ ★ ★

"Next time unplug your earphones!"

AIRMAN'S WORLD

YESTERDAY IN UNIFORM . . .

This collection of ancient armor, one of the finest in the world, is in Madrid's military museum. Opportunities to visit the far-reaches of the globe and study firsthand its history and cultures are important advantages of the world of the airman today.

- For people—the Soldier's Medal
- In events—three new records
- On books—an historical month
- And—Our Air-Minded Ancestors

INSIDE AIRMAN'S WORLD

People *who rank*

THEY MADE NEWS THIS MONTH

THE Nation's highest peacetime military decoration, the Soldier's Medal, was awarded to SSGT. JOHN DISLER recently at Andrews AFB, Md.

A member of the 95th Fighter-Interceptor Squadron, Disler received the medal for saving a nine-month old baby from the bedroom of a burning house October 25, 1958.

AND in Abilene, Tex., A/1C JAMES CALFEE walked across the street to visit a neighbor and became a hero.

The Dyess AFB airman found Gary Lee Killingsworth, 23 months, choking and turning blue. Calfee applied mouth-to-mouth artificial respiration and sucked a large grape from the youngster's windpipe. Said Mrs. Killingsworth, "We had given up hope. God bless Jim Calfee."

ALSO recommended for the same award are two McConnell AFB, Kans., airmen who saved three members of a Kansas family from drowning.

SSGT. LUTHER MCFARLAND and A/2C HARRY NORWOOD spotted the three Noblit family members pinned in their automobile which had plunged from a bridge into the swollen Big Arkansas River. The airmen freed the trapped victims and got them safely ashore. A fourth victim thrown clear of the wreckage, perished in the accident.

SECONDS meant lives recently when LT. DUANE OSWALD'S North American F-86L flamed out over North Dakota.

Unable to make the Grand Forks AFB runway, Lieutenant Oswald spotted a straight, clear road directly ahead. As he lined up his fighter, he saw a car approaching head on. Lifting a wing slightly as the two closed, he set his crippled aircraft safely on the ground. Total damage—a slightly dented car top, a bent wing, and two sets of shattered nerves. Total saving—two lives and an $850,000 fighter.

EQUALLY fast thinking by three Westover AFB, Mass., airmen saved a half-million dollar engine from destruction in a test block.

The trio was completing a full-power check when the throttle froze wide open. Leaving A/2C ROBERT KESSLER at the controls, SSGT. MACK SHAW and A/2C RICHARD REED rushed into the test cell and derigged the afterburner controls, allowing the engine to be retarded to idle position until it had cooled down enough to be shut off.

WESTOVER AFB was also the scene of a dramatic airborne "save" of a Fairchild C-119 *Flying Boxcar* by SSGT. KERMIT ROSEBERRY, a reservist with the 302d Troop Carrier Wing, serving as flight engineer.

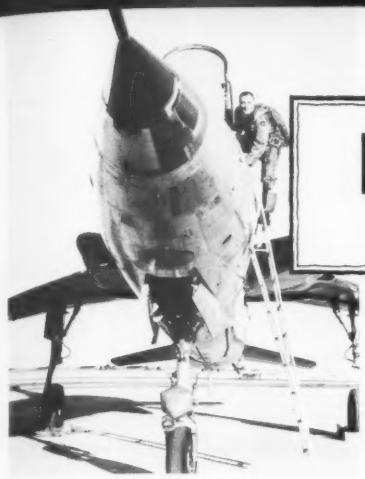
As the craft began its final approach, warning lights revealed the nose gear had failed to lock in the down position. Inspection disclosed a small piece of metal lodged in a manner which prevented complete locking action. After repeated attempts to free the gear, Sergeant Roseberry entered the nose-gear well. Working in cramped quarters, he rigged a temporary brace with chains and jacks. The aircraft landed without incident.

TECH orders require that jet pilot hard-hats and oxygen masks be checked and cleaned at least every 30 days. Until recently, the process was a time-consuming one. Now two Myrtle Beach AFB, S. C., airmen, LT. JAMES CARTWRIGHT and SSGT. MAURICE OUZTS, have cut the 45-minute task to a three-minute job by rigging a test stand that allows simultaneous testing of the microphone, headset, and oxygen equipment at simulated levels up to 45,000 feet.

Air Training Command believes it has the only all-WAF chapel choir in the USAF. The 16-woman group has been formed at Sheppard AFB, Tex., from among student WAF. Director is A/1C George Lee.

Events *that count*

ITEMS THAT REFLECT AIR FORCE PROGRESS



Moore, closed course . . .

For Jordan, altitude . . .

Rogers, straightaway.

A rash of record claims starring USAF Century Series fighters enlivened aircraft news in recent weeks. All claims have been submitted to the Federation Aeronautique Internationale in Paris for official world-record sanction.

Altitude:

Dubbed a "missile with a man in it" almost from its inception, the Lockheed F-104 *Starfighter* soared to a new record altitude of 103,395.5 feet. Piloted by Capt. Joe Jordan, the feat eclipsed previous claims of both the U. S. Navy and the USSR. Captain Jordan was awarded a DFC, and the General Electric trophy for significant achievement in aviation.

Closed Course Speed:

USAF's newest Century Series entry, the Republic F-105 *Thunderchief*, also claimed a new crown. Flashing at 1,216 m.p.h. over a 100-kilometer closed course at Edwards AFB, Calif., Brig. Gen. Joseph Moore surpassed the French-held record of 1,100.4 m.p.h.

Straightaway Speed:

Over an 18-kilometer straight-away course, a Convair F-106 *Delta Dart* flew combined up and down wind legs which averaged 1525.95 m.p.h. to erase an earlier Russian claim of 1483.9 m.p.h. The ship was pilotéd by Maj. Joseph Rogers over the measured course at Edwards.

Last month, SAC's 30th Com-munications Squadron jumped to group status at Offutt AFB, Nebr. The new 1st Communications Group now encompasses the 30th, 31st, and 32d Communications Squadrons, and detachments at Elkhorn and Hooper, Nebr. No change in personnel strength was involved.

The changing composition of USAF was cited as the reason for the current closing of Ethan Allen AFB, Vt. The 37th Fighter-Interceptor Squadron, which occupied the ADC station, is also being inactivated.

Three of Air Weather Service's five weather reconnaissance squadrons will cease operations at the end of the current month. They are the 53rd at RAF Station Mildenhall, England; the 54th (Typhoon Chasers) at Andersen AFB, Guam; and the 59th (Hurricane Hunters) at Kindley AFB, Bermuda.

Convair is exploring the feasi-bility of a manned rocket vehicle to boost satellites and similar bodies into space, then return to its launching site.

Hamilton Standard, a division of United Aircraft Corp., is designing an air conditioning system they will produce for the Northrop T-38 supersonic jet trainer.

Bendix Aviation Corp., is studying developments in the field of automatic pilots. Goal is production of a "George" with no moving parts.

Boeing Airplane Co. has made patent application on the design of a ramjet engine capable of propelling a vehicle at Mach 16.

A new "Quickmix" process which will permit manufacture of solid propellants in the field, is under development by Rocketdyne, a division of North American Aviation, Inc.

Briefs

- Martin's TM-61A *Matadors* have outlived their usefulness as firstline missiles, but they are still serving a definite purpose. Most are being ticketed for extinction via the drone target route for more modern ground-to-air and air-to-air weapons.
- Convair recently flight-tested a wind deflector to prove that the B-58's canopy can be safely ejected under emergency conditions with the deflector installed to protect crew members.
- MSTS has halted passenger runs from Seattle, Wash., to Alaskan ports, except for isolated cases. Future transferees and dependents assigned to the 49th state will either drive their private vehicles up the Alcan highway or fly.
- The Air Force Missile Development Center, Holloman AFB, N. Mex., has accepted delivery of the largest, longest, heaviest sled ever designed for use on its famed seven-mile test track. The RS-2 is capable of achieving acceleration conditions equal to 15 Gs.

Aerospace Library

Philosophical Library has just released **German Secret Weapons of World War 2,** an excellent survey of their development. The book is by Rudolf Lusar and sells for $10.00.

Conquest of the Air by Hendrik de Leeuw, published by Vantage Press, Inc., for $4.95, not only presents a fascinating account of the past but also probes the possibilities of the future.

David C. Cooke's **Bomber Planes That Made History** is a readable companion to his two earlier works on transports and fighters. Its scope extends from such early "kites" as the DH-4 to Convair's B-58 *Hustler*. It sells for $2.50 and is published by G. P. Putnam's Sons.

Red Sky at Night recounts the intriguing adventures of Jo Gapka, the renowned Czech pilot who recently escaped to England. Written by Kendall McDonald, the work is published by Roy and sells for $3.50.

Philosophical Library has also scored in another field with an excellent four-language **Dictionary of Atomic Terminology.** Alphabetical listings in English are followed by German, French, and Italian sections, each numerically keyed to the English definitions. It is edited by Lore Lettenmeyer and is available for $6.00.

Theodore Gordon, the Douglas engineer who fired the now-famed 71,000-mile *Pioneer,* and Julian Scheer have combined their talents to produce **First Into Outer Space.** From the St. Martin's Press, this $3.95 work is a factual account from "inside the firing blockhouse."

In the field of aviation fiction, **Back of Sunset** and **Missile Away,** both rate notes. Jon Cleary wrote the former which centers around the Royal Flying Doctor Service in Australia. It is published by Morrow and costs $3.95. The latter is the latest Kent Barstow adventure by Rutherford Montgomery. Duell, Sloan and Pearce have marked it with a $3.00 price tag.

Finally, the month brought forth three fine books in the missile and space field. **The Soviet Air and Rocket Forces,** edited by Asher Lee and published by Praeger, is a collection of professional essays. **Soviet Space Science,** the story of their artificial satellite program, is published by Basic Books and written by Ari Shternfeld. Fleet Publishing Corp. has released **Target for Tomorrow,** a study of developments in this general field, written by Dr. I. M. Levitt, Director of the Fels Planetarium. Respectively they are priced at $7.50, $6.00, and $4.95.

You Ask It

Q. Before I retire, I would like to begin converting my WW II GI term insurance policy. Do I have to convert it all at once and all to the same plan?

A. No to both questions. First, you may not convert less than $1,000 of your term insurance, and any amount exceeding that must be converted in multiples of $500. You may convert your term insurance into any of the several plans available.

Q. I will soon be discharged and plan to go into a line of work that is generally regarded as hazardous by insurance companies. Would such employment invalidate my GI insurance?

A. There are no such restrictions on GI policies. A veteran may engage in any occupation, no matter how hazardous, without altering the terms of his policy or the amount of his premium.

Q. I understand that warrant officer classifications are to be converted from superintendent specialties to the most nearly related officer specialties and skill levels. Can you tell me when this will be accomplished?

A. Instructions for this action are contained in the revised edition of AFM 35-1 which became effective on the last day of last month. The same publication also contains full details on classification of the E-8 and E-9 skills.

Q. Does an airman have recourse to appeal a performance report which he considers unjust?

A. Yes. Anytime you receive an APR which you consider to be inaccurate, unfairly prejudicial, or unjust, you may appeal through your squadron commander.

Q. I work directly under an airman first class. Why is it that he does not write my performance report?

A. Regulations provide that among the enlisted grades, only noncommissioned officers may complete APRs. If you work directly for an airman, your report will probably be filled out either by his NCOIC or OIC.

Q. I was recently eliminated from formal school training. Is there any way in which I can reapply for another course at a future date?

A. Yes. After a lapse of one year, you may reapply providing your control AFSC is still on the resource skill list.

Q. I recently accepted officer indefinite career status. Now I have changed my mind. How long must I serve before I am eligible for release?

A. You may apply upon completion of one year of your indefinite status. Your application for such action should be submitted under Section H, AFR 36-22.

Panorama

SMALL PLANE CHARACTERISTICS and big plane capabilities might best describe this testbed Boundary Layer Control Lockheed C-130 *Hercules*. The sharp 90-degree flap angle and added YT56 Allison load compressor engines—designed to pump a steady jet of compressed air over the control surfaces—allow landings with a ground roll of less than 500 feet. The unique arrangement correspondingly reduces the length of takeoff runs.

NO STONE is being left unturned in preparing for *Project Mercury*. Scale models of the astronaut's capsule are being subjected to Mach 20 tests in Arnold Engineering Development Center test facilities. Speeds simulated at this Tennessee installation parallel those which are expected to occur during the critical reentry portion of the space flight, programmed for next year.

Our Air-Minded Ancestors

"Five thousand balloons, capable of raising two men each, could not cost more than five ships of the line; and where is the prince who can afford to cover his country with troops for its defense as that 10,000 men descending from the clouds might not in many places do an infinite deal of mischief before a force could be brought together to repel them."

Benjamin Franklin
Letter to Jan Ingenhousz,
January 16, 1784.

More than 160 years later, on D-Day, June 6, 1944, American Troop Carrier aircraft dropped more than 17,000 paratroopers behind enemy lines in Normandy.

HIS REPUBLIC AIRCRAFT CORP. BUDDIES call Lin Hendrix the triple-T man—test pilot, Model T owner, and *Thunderchief* jockey. At any rate, Henry's lizzie and USAF's F-105 provide a startling contrast in 50 years of transportation's history. One is capable of a top speed of 38 m.p.h., the other, more than 1,400.

In the Name of Congress

No. 18 IN A SERIES

As 1944 opened in Europe, deeper aerial thrusts were the order of the day, and improved protection for the bomber crews a must. New, long-range fighters provided the needed

TOP COVER

JANUARY 1944 qualifies as a major milestone in the annals of WW II aerial warfare.

In the overall Air Force effort, it presaged the end of German control of the skies over the Continent. Long-range fighters, a protective "must" for deep bomber penetrations, began arriving at bases in England in growing numbers.

On the individual front, it marked the award of the first Medal of Honor to a fighter pilot in the ETO. He was Lt. Col. James H. Howard, commander of the 356th Fighter Squadron, 354th Fighter Group.

The combination of his talents and the attributes of the famed North American P-51 *Mustang* wrote a glowing chapter in the story of aerial accomplishment.

But Colonel Howard's combat story begins long before those early January days of 1944. He entered the service in the late 1930s as a member of the United States Navy. After completion of flight training, he was assigned to the carrier *Enterprise* and rose to the grade of lieutenant.

However, Howard, who was born in Canton, China, became impatient with developments in the flaming Japanese war against China and, in the summer of 1941, he chose to resign his commission and join the American Volunteer Group.

During the succeeding months, Howard gained priceless combat experience as a Flying Tiger and scored seven kills along the way. When the Tigers were called to active duty, however, he chose to return to the United States as a civilian.

Within days after his arrival in late 1942, he received offers from both the Army and Navy air arms, finally choosing the former and returning to active duty as a captain in January 1943.

After several other assignments, Colonel Howard joined the 356th, completed training, and then led the squadron to England as its commander.

The 354th Fighter Group, first *Mustang* equipped organization to arrive in England in November 1943, began operations less than a month later.

Their initial engagement came on December 1—a comparatively short sweep against Amiens. During that month they mounted a total of 361 sorties—each testing slowly extended ranges. Among the many targets to which they accompanied the heavies during this phase were Kiel, Ludwigshafen, and Bremen. (See, *Prologue to Invasion,* Feb. '60 issue.)

Despite the fact he was not the ranking man in the

by SMSgt. Hal Bamford

Col. James H. Howard

organization, Colonel Howard led many of the early strikes because of his extensive experience in the skies over China. In this capacity he led one of the first major long-range cover missions of the new year.

On January 11, the weather over central Germany cleared for a brief period after an extended string of impossible flying days.

Oschersleben (See, *Defeat From the Air,* Sept. '59), the principal center of FW-190 production, was selected as the key target, with Halberstadt and Brunswick included as diversionary goals. Combined, 663 B-17s and B-24s were to form the bombing groups. The lead element was assigned to Oschersleben and was to receive fighter cover all the way. The other two formations were to be escorted to within about 70 miles of their targets, then picked up again during withdrawal.

Takeoff, rendezvous, and initial penetration of the air zones over the Continent went as planned. In the meantime, however, the weather over the target areas began to deteriorate. In England, the decision was made to recall the strike. In the confusion that followed, not all the units received the recall signal, and others had penetrated deeply enough that their leaders chose to ignore it and continue their missions.

More than 400 of the bomber force turned back, unloading their bombs on targets of opportunity as they made their homeward trek. In all, 238 pressed on, 139 of which aimed for Oschersleben.

The target city was a scant 90 miles from Berlin, and the German Air Force began to react in force to protect the capital. By using belly tanks, GAF fighters were able to bide their time, staying clear of the escort and waiting their opportunity. As the formations penetrated deeper and deeper into Hitler's Reich, more and more of the escorting American fighters were forced to break away and return to their home stations.

Just short of the target and with the escort stripped to a few remaining P-51s, the Germans attacked.

The citation which accompanies the award of USAF's 25th Medal of Honor dramatically relates the ensuing actions of Colonel Howard.

For conspicuous gallantry and intrepidity above and beyond the call of duty in action with the enemy near Oschersleben, Germany on 11 January 1944. On that day Colonel Howard was the leader of a group of P-51 aircraft providing support for a heavy bomber formation on a long-range mission deep in enemy territory. As Colonel Howard's group met the bombers in the target area the bomber force was attacked by numerous enemy fighters. Colonel Howard, with his group, at once attacked the enemy and himself destroyed a German ME 110. As a result of this attack Colonel Howard lost contact with his group and at once returned to the level of the bomber formation. He then saw that the bombers were being heavily attacked by enemy planes and that no friendly fighters were at hand. While Colonel Howard could have waited to attempt to assemble his group before engaging the enemy, he chose instead to attack singlehanded a formation of more than 30 German airplanes. With utter disregard for his own safety he immediately pressed home determined attacks for some 30 minutes, during which time he destroyed three enemy airplanes and probably destroyed and damaged others. Toward the end of this engagement three of his guns went out of action and his fuel supply was becoming dangerously low. Despite these handicaps and the almost insuperable odds against him, Colonel Howard continued his aggressive action in an attempt to protect the bombers from numerous fighters. His skill, courage, and intrepidity on this occasion set an example of heroism which will be an inspiration to the Armed Forces of the United States.

Colonel Howard's four wins marked the high point of early fighter-escort missions over the Continent. In succeeding weeks, he added three additional kills, to equal his total over China, and was elevated to the position of group commander when his predecessor was killed in a midair collision with an enemy fighter.

At war's end he decided to leave active service, but to retain his ties as a reservist. Today, he lives in a quiet northwest suburb of the Nation's capital and heads a civilian engineering company which bears his name. He has also been appointed as brigadier general and has an M-Day assignment in the Office of the Director of Operations, DCS/O, Hq USAF.

The Jet Stream

by Dave Karten, *Airman Staff*

Jets flying at high altitudes take advantage of the upper air winds. Not Longfellow's "gentle wind, a sweet and passionate wooer . . . ," but the mightiest of them all . . . the 200-300-knot torrent of air that girdles the globe.

At a midwest Air Force base recently the weather report read: ceiling and visibilty unlimited; surface winds a mild 11 m.p.h.

But the weather forecaster at the base had a very different report on the weather six miles up. There, the great Jet Stream itself, flanked by belts of turbulence, hurtled toward Newfoundland at 160 m.p.h.

The strong winds did not directly concern the pilots of conventional propeller planes whose normal ceiling is below 20,000 feet. But to the USAF jet fighters and bombers that cruise most efficiently in the thin air, the presence of the Jet Stream that day was important.

The general direction of the Jet Stream is from west to east and for jet planes the meandering river of upper air winds can be a "built-in tailwind" on eastbound flights or a treacherous headwind on westward flights.

The phenomenon of the Jet Stream is probably as old as the Earth itself but for centuries men knew nothing of it. Then in 1883, a virtually unknown volcanic island called Krakatau, lying between Java and Sumatra, exploded with such fury it was heard nearly 3,000 miles away. The Earth-shaking volcanic blast carried ash an estimated 17 miles above the Earth.

The speed with which the clouds of dust spread around the world suggested the existence of fast-moving winds at extremely high altitudes. But decades passed before the clue was followed up. Then as aviation got under way, pilots began reporting unusual incidents with winds at upper levels.

One day in 1918, the late Maj. R. W. "Shorty" Schroeder, a test pilot for the technical section of the Air Service, took a Le Pere biplane higher than man had ever dared to go before. (See *The Man with the Frozen Eyeballs,* page 14.) He soared to 30,000 feet over Dayton, Ohio and headed west . . . nevertheless he came down in the Allegheny Mountains, 200 miles east of where he had started. A powerful jet stream had shoved him backwards to make him a sort of unwilling "Wrong-Way" Corrigan of his day.

When he told his story, pilots and meteorologists shook their heads. Perhaps lack of oxygen at the high altitude had befuddled him, they suggested. Or maybe he had been flying in a direction different from what he thought. But Major Schroeder insisted that up there around 25,000 feet there must have been a strange and powerful windstream. Still the experts scoffed.

And so it went for a quarter of a century. From

time to time reports would crop up about the existence of these fast-moving currents of air. British and German weather scientists noted the existence of strong winds high in the atmosphere. The British meteorological office even ran a series of balloon tests in 1925. One balloon travelled 570 miles in four hours. The fact was noted, but no further investigations were made. Since aviation was not conducted at very high altitudes in those days, such reports were considered unimportant. In 1933, German meteorologists again reported the existence of a band of high-speed winds in the upper air. The information was published and promptly forgotten.

Then, during World War II, the winds' effect on military aircraft began to seriously affect Air Force combat missions. Weathermen realized that extended aircraft ceilings demanded increased attention to upper air streams.

In March 1944, for instance, a RAF raid on Berlin was seriously disrupted by a very strong wind which scattered the bombers and carried them far south of the target. One bomber found itself over Leipzig and had to fly north to Berlin. Some navigators actually measured winds in excess of 100 knots but disregarded their findings. They had been briefed to expect gusts of about 40 knots. After the war a study of German upper air charts showed a strong Jet Stream had been over Berlin at the time.

Later the same year, U. S. Air Force B-29s, flying bombing missions from the Marianas to Japan, encountered such tremendous headwinds that they almost stood still . . . even with engines roaring full throttle. The weird slowdown cut into fuel reserves, forcing the pilots to jettison their bomb loads and turn homeward long before reaching Japan.

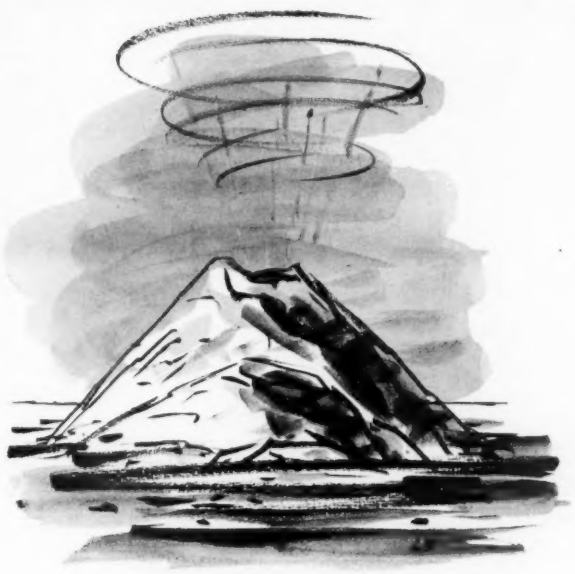
Balloon Warfare

"Big Westerlies" occur from Tokyo to Honolulu, over the U. S., and from North Africa to the Indian Ocean. Although they didn't know their behavior pattern, the Japanese in World War II did know there were strong winds blowing from their islands across the North Pacific toward the American continent.

They used these winds to carry more than 9,000 combat balloons toward the United States in one of the least known operations of the war. Thousands of these balloons reached southern Alaska, western Canada, and the northwestern U. S. We know now that they were carried along by the Jet Stream.

However, at the time a strong veil of secrecy covered this operation and no word leaked back to Japan that the operation was successful. Fortunately, most of these Japanese balloons landed in remote areas. Some did start disastrous forest fires, and in Oregon in 1945, the curiosity of an 11-year-old, who spied one of these balloons on the ground, resulted in the death of six persons.

After the war, meteorologists got more startling evidence that something odd was going on in the sky. Radio-carrying balloons, now greatly improved and able to reach higher altitudes, behaved in a fantastic



Krakatau furnished a clue

manner. For the first 15,000 feet they would float quietly aloft. Then they would sometimes go crazy and whisk off horizontally as if jerked by an invisible hand.

Calculations based on the automatically sent radio messages showed they were traveling at incredible speeds . . . 200 . . . sometimes more than 300 miles an hour. What did it all mean?

Weathermen confessed that no theory they had developed could account for these mad winds in the heavens. By 1947, the mystery of the Jet Stream became the greatest meteorological detective story in history.

Then a University of Chicago group started putting the pieces together. After studying all the scattered evidence they had an answer. Weather reports collected from around the world showed mighty wind streams blowing along varying routes from west to east some 2,000 miles north of the equator.

These weren't crazy unrelated gusts. They were mighty, incredibly powerful streams of air girdling the globe. Sometimes they appeared in segments and occasionally they joined to form one mighty river of air which the Chicago weather researchers christened the "Jet Stream." Corresponding winds were discovered blowing south of the Equator.

Black Sheep

The next step was to map this "phantom river in the skies" with more exactness. From strategic points all over the U. S., radio-carrying balloons went aloft and sent back messages. Air Force and airline pilots provided more facts about the strange winds that either helped or hindered them.

Air Weather Service's *Project Black Sheep* at MacDill AFB, Fla., in 1951 sent specially equipped B-47s aloft to obtain Jet Stream information usable to SAC crews. The Air Research and Development Command's *Project Jet Stream* used a B-47 at MacDill and a B-29 at Patrick AFB, Fla., to research the Jet Stream. Under the immediate supervision of Air Force Cambridge Research Center scientists, eight or nine operational flights were made into the Jet Stream every month. Each plane was equipped with instruments to measure winds, temperatures, humidity, and turbulence. Observers used tape recordings to make verbal descriptions while they were in flight. The researchers learned that the Jet Stream would be of considerable aid to military and commercial aircraft. But they found there is also danger involved when an aircraft unknowingly enters the stream in the wrong direction. Project findings resulted in an extensive revision of flight planning techniques. Called optimum flight planning, it adapted pressure pattern navigation to Jet Stream core altitudes.

An important step toward putting the Jet Stream to work for aviation came on the bitter cold dawn of January 31, 1951, when airline captain Charles F. Blair Jr., Brig. Gen. USAFR, took off from Idlewild in a souped-up World War II *Mustang*. His purpose: to use the Jet Stream for an ocean crossing.

When he passed Gander Airport in Newfoundland, two hours and 40 minutes out of New York, Blair learned that he had somehow missed the Jet Stream. Weathermen gave him a course to hit it.

Hardly more than an hour later over Ocean Station G, a Coast Guard weather ship, he heard good news. The radar operator had been carefully tracking his plane and reported, with astonishment, that the *Mustang* was hitting better than 600 miles an hour.

Blair was riding right in the middle of the stream, going 225 miles an hour faster than his plane's air speed. Just seven hours and 48 minutes from take off at Idlewild, his wheels touched down at a London airport. Though he had ridden the Jet Stream only part way, his comparatively slow plane had broken the record for trans-Atlantic flights with an average speed of seven and a half miles per minute for 3,479 miles.

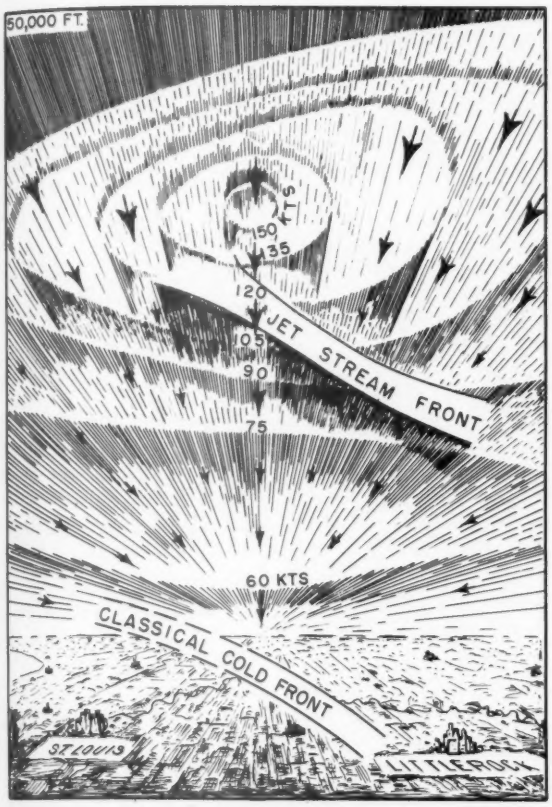
Today the Jet Stream and its behavior are pretty well defined.

In simple practical terms, say weathermen, "Jet Stream" is merely a handy name for centers of high-speed winds. As such, it is comparable to the common practice of referring to centers of low-pressure areas on the weather charts seen in newspapers and on television simply as "lows." The term "Jet Stream" does not refer to a single entity that is detachable from the rest of the atmosphere any more than does the term "low."

The Big Wind flows in a mighty torrent, twisting and turning in a great band around the Earth. It varies widely in geographical location and altitude, moving in wandering courses between 20 and 70 degrees north latitude, up and down vertically between 20,000 and 40,000 feet altitude but sometimes dipping as low as 10,000 feet. Segments of the Jet Stream are where you find them. They don't follow any set course. Their width may vary from 300 miles to something less than 100. The full violent current, however, is at its swiftest in a 25- to 50-mile band at the center just as the current of a river is most powerful there. The fastest Jet Stream found so far was clocked over Japan at a speed of 450 miles an hour. The turbulence inside these rivers of air is comparatively mild, completely unlike the sustained roughness found in clouds and winds at lower levels.

Despite the increased emphasis on Jet Stream research, weathermen are still not entirely sure what powers the Big Wind. They believe the stream is a vast current of swirling atmosphere sandwiched in between the continuously rising warm air masses at the equator and cold fronts steadily pushing in from the Polar regions. The pressure caused by the two colliding air masses is at least partially responsible for the stream's great velocity. Another factor is the Earth's rotation. The Northern Hemisphere stream goes "upstairs" in the summer, the one south of the equator comes "downstairs." The reverse is true in the winter.

The Northern Hemisphere Jet Stream, potentially the most useful because it parallels the historic trade routes, splits at various points. One of these splits occurs when the stream hits the vast Himalaya ranges. The northern fork pours torrentially across China, where it is given a push by tremendous pressures of Arctic air from Siberia. By the time the Jet Stream hits the California-Oregon coast it slows down somewhat, but pressures over the Cascade and Sierra Nevada



THE JET STREAM FRONT *is a new concept related to classic characteristics of warm and cold fronts near surface levels.*

mountains divert it upward with new velocities. Then it swirls over the Rocky Mountains . . . across the U. S., the Atlantic, and Europe . . . and back to the Himalayas for a new "kicker" to begin again its ceaseless circling of the planet.

In February 1959 the U. S. Weather Bureau began operating a new high-altitude forecasting service that helps jetliners find and use the Jet Stream. Most of the information comes from weather balloons launched every six hours which report data to seven main stations. At the National Weather Analysis Center at Suitland, Md., this data is digested, plotted on charts, and sent by facsimile transmitters across the country.

The Air Research and Development Command's Geophysics Research Directorate recently concluded a four-year airborne observational program of high-speed upper-wind regions. Data, gathered in a B-47 specially equipped to take very accurate wind and temperature readings, is now being studied by GRD and Texas A&M scientists. Some tentative conclusions reached by GRD scientists are summarized in an "Idealized Model of the Jet Stream." This model introduces a new concept, the Jet Stream Front, and the Jet Stream Region. The front's characteristics are said to be similar to the classical warm and cold fronts found near the ground in that temperature and wind change rapidly as you fly through it. This front apparently exists only when the wind speeds in the core of the Jet Stream are greater than 125 knots. More definite information on the Jet Stream front and other atmospheric phenomena occurring in the Jet Stream region is expected when the study is completed.

Super High Streams

While the first problem in Jet Stream research is to find out where and how they are created, a secondary program aims at exploring such streams of air at higher altitudes than those currently being observed. This is vitally necessary because jet planes soon will be making routine flights at the higher altitudes. Only recently, Capt. Joe B. Jordan, test pilot at Edwards AFB, Calif., flew to 103,395 feet in an F-104 *Starfighter*.

One super high-altitude Jet Stream at the one hundred thousand foot level has already been discovered by instruments sent aloft in rockets and balloons. It is much faster than the Jet Stream at lower levels. Even on its fringes there are winds of better than 200 miles-an-hour. This would indicate that its "core" might be moving upwards of 500 m.p.h. No one knows for certain though.

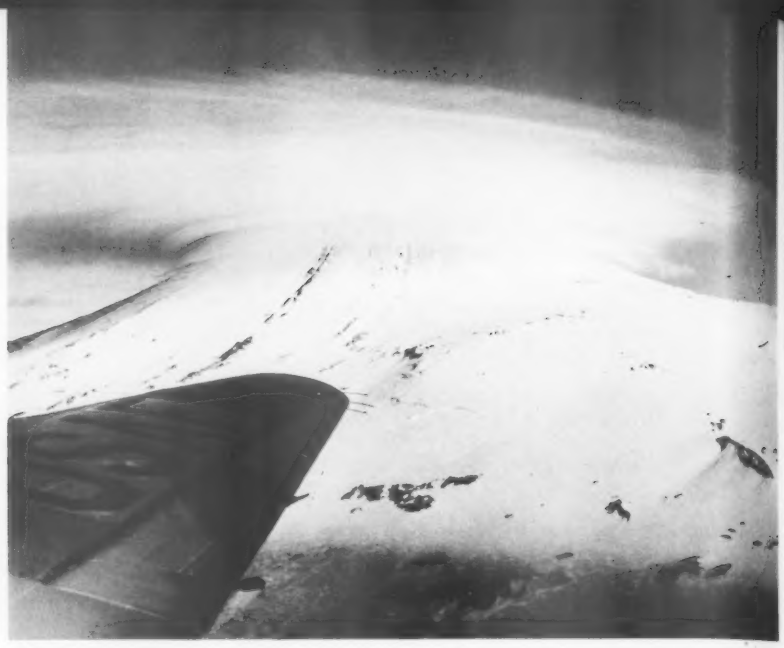
New discoveries are proving that the Jet Stream is far more than simply a powerful new factor in aviation. As they pore over their maps, weathermen are struck by the fact that the speed and course of the stream high aloft is tied to weather on the Earth's surface. Undulating from west to east around the world, they may pull a storm or even a hurricane far out of its destined course. Some weathermen believe the Big Winds are the chief means by which air is exchanged between the tropics and the poles. If it were not for this exchange, they point out, the equatorial regions might become impossibly hot.

In the Jet Stream they feel they may, at long last, have a lead on many weather mysteries. What makes the great sweeping air masses called cyclones move across the Earth the way they do? What determines their course? Why do they move so fast?

There just weren't any answers until weathermen started linking Jet Stream activities with weather on the Earth's surface. They would note a change in the course of the stream far out over the Pacific and just like that, an air mass rolling down the Arctic would change its course and soon rain would lash the West Coast, winds rip across the plains. They would see another change in the Jet Stream—and in a few days East Coast residents would be suffering one of their record heat waves.

Hundreds of checks indicated that these phenomena were not accidents. The Jet Stream is associated with the birth and intensification of storms and fair weather areas across the weather map.

The importance of the Jet Stream was succinctly summed up by an Air Force pilot: "Weather," he said, "long considered to be one of aviation's greatest foes . . . now, is becoming one of our greatest friends."



Birthplace of the Winds

by TSgt. James R. Doherty, *McCoy AFB, Fla.*

With a shudder, thousands of WW II GIs recall duty in the Aleutian Islands. They wouldn't know the place now, but a few score selected airmen are making its acquaintance.

A "CONSTRUCTION STIFF in uniform" is what he called himself, but Capt. Don Jewell didn't look the part. He wore senior pilot's wings, his face was only mildly tanned, and the finger he stabbed at a map of Alaska was callous-free.

"We'll land at Cold Bay first," he said, "to refuel. From there we'll hop to Driftwood Bay and Nikolski. Project Stretchout ends there, you know, on Umnak Island."

The captain paused while he smoothed the map flat on his desk top.

I digested the unfamilar names. Project Stretchout I knew about. That was "Air Force" for a Distant Early Warning Line extension along the Aleutian Islands chain. The other names were as meaningless as an Eskimo clearing his throat.

"But we've got one Dew line now," I said, "why another?"

The captain straightened the sign on his desk that proclaimed him chief engineer of Alaskan Air Command's Design Division. Next, he gave me a look that sliderule mechanics usually reserve for do-it-yourself carpenters. Finally, with a sweep of his arm, he indicated the 1500-mile long Aleutian Islands chain, curving across the North Pacific like the spinal column of a fallen Colossus.

"Two burglar alarms are better than one," he replied, "take a look at the chart. Our existing radars have the Alaskan mainland pretty well 'locked.' With the Aleutian Dew line in operation we'll be able to check out every seagull bound from Southern Siberia to the U. S."

EDITOR'S NOTE: The Aleut Indians call their treeless islands the "Birthplace of the Winds" since sudden fierce storms often bring with them winds up to 120 m.p.h. This story is an account of Sergeant Doherty's first visit to the Aleutians during the final days of *Project Stretchout*. This USAF project was completed last May and extended our Alaskan Dew line the length of the Aleutians. Anchored on the mainland at King Salmon, the extension includes six sites: Port Heiden, Port Moller, Cold Bay, Cape Sarichef, Driftwood Bay, and Nikolski.

Seagulls, I thought, or jet planes—or missiles.

I looked at the chart. Facing Alaska across the narrow Bering Strait lay the vast Union of Soviet Socialist Republics. Directly opposite the Seward Peninsula, a bare 50 miles of water separated Siberia from our 49th state.

Zig-zagging in between, a divider of east from west, today from tomorrow, lay the International Dateline. At one point it was straddled by a pair of pin-prick islands.

"Big and Little Diomede," the captain explained. "Three miles apart. We own one, the Reds the other."

"Gotta run," he grinned, punching me in the ribs with the rolled up chart. "See you on the flightline. Wheels up at 0600."

That was yesterday.

This morning the rain is shiny on the Gooney Bird's skin. It runs in finger-wide rivulets off the wings, collects on Elmendorf AFB's runways.

From his left seat position in the cockpit, Captain Jewell gently, but firmly, eases the throttles forward. With a resigned creak our dowager C-47 begins rolling.

Cold Bay, I am told, is perched where the land ends and the Aleutians begin on the Alaska Peninsula's wind bedeviled tip. To reach it from Elmendorf AFB, you fly some 562 miles due southwest.

Cold Bay is headquarters for the 714th Aircraft Control and Warning Squadron, which administers the Aleutian Dew line. It is ideally situated. Two stations, Port Heiden and Port Moller, are located nearer the Alaskan mainland. Three others, Cape Sarichef, Driftwood Bay, and Nikolski lie beyond on the chain proper. Weather permitting, we will get an aerial peek at the lot.

Today we're in luck; the storm is local. At 3,000 feet our aircraft breaks into the clear. Through a hole in the clouds I glimpse Fire Island, lying offshore from Anchorage—Alaska's largest city. Forty-mile long Turnagain Arm is a watery peninsula shooting off to the left.

Outbound, I count the salmon trawlers inching across Cook Inlet, then the glaciers hanging like wet wash in the high gorges of the Chigmit Mountains off our right wing tip.

But my fellow captives in the Gooney Bird's cabin are Air Force engineers. They've been this route before. Soon we are talking, playing poker. Three cigarettes and a dozen hands later St. Augustine Island is left behind.

At Kamishak Bay I toss in my hand. The Valley of 10,000 Smokes is coming up. An Alaskan conversation piece, the valley is a showplace of the Katmai National Monument, a park larger than the State of Maine.

But we are nearing the Aleutians, famed "Birthplace of the Winds," and origin of the world's worst weather. Suddenly, with a shudder and a shake, our plane plunges into the inevitable overcast. For the next two hours I blow smoke rings at an opaque circular window and ponder the validity of Captain Jewell's instrument card.

Cold Bay, which swarmed with some 40,000 GIs

Cold Bay, Alaska, site of Aleutian Dew line squadron headquarters, is also refueling point for a number of international airlines. Area is marked with hundreds of WW II temporary structures. During height of North Pacific action 40,000 American GIs were stationed at Cold Bay, near the tip of the windswept Alaskan peninsula.

during World War II, is today but a tumble-down reminder of its former self. Covered with knee-deep grass, its treeless hills are dotted with hundreds of crumbling quonset huts abandoned to the elements. Here and there giant wooden hangars that overlook acres of unused tarmac sag drunkenly in the wind.

While our Gooney is being refueled Captain Jewell and I pay a visit to the Cold Bay site. Eleven miles from the landing strip, it is trademarked by a towering radome that houses an antenna the size of our airplane. Surrounding tower and living quarters are four additional antennae that might have been swiped from a southern California drive-in movie.

The latter are components of Alaska's "White Alice" communications system. An ultra-high frequency signal is bounced from the screen's face, reflected into the heavens. The earth's tropospheric layer sends it rebounding earthward, to be picked up by another of the system's antennae. Terrain and weather interpose no obstacles to this "tropo-scatter" communication.

Unlike northern Dew line sites, Aleutian stations are manned by Air Force personnel. As squadron headquarters, Cold Bay will boast a few more than the rest. This is remote duty that promises to be downright desirable.

Captain Jewell points out an expensive "hi-fi" radio and record player that occupies one corner of the site's combination dining hall and recreation room. A well-stocked library is ranged along another wall. The room is decorated in restive pastel colors, furnishings have been tastefully selected. It seems strange that no uniforms are in evidence. Jewell explains.

"Right now the majority of people here are installers from Western Electric Company. About 20 altogether." He gestures upward. "The tower there is built to accommodate more electronic gear than you can shake a stick at. It's improved stuff that only the manufacturer knows about. When the installation phase is completed, the WECO types will stick around awhile to check our boys out. Then we'll take over."

Riding back to the flightline, Captain Jewell briefs me on some larger ramifications of the Aleutian Dew line. I learn more of how the system will augment Alaska's already intricate warning network.

Mainland anchor point for the line is Alaskan Air Command's Aircraft Control and Warning Station at King Salmon. This 200-man outpost, spotted at the base of the Alaska Peninsula, is but one of many such radar installations scattered throughout America's 49th state.

Most are incredibly isolated. A few, according to Captain Jewell, are located atop remote mountain peaks at elevations that would give "nosebleed to an eagle." Twenty-four hours a day their inhabitants maintain their "scope and sweep" vigil along the aerial approaches to Alaska and the U. S.

Beyond the Arctic Circle operators of the famed northern Dew line are on watch. Designed to alert of an attack launched across the top of the world, this is a joint U. S.-Canadian effort. Alaskan Air Command is responsible for logistical support of the more westerly segment.

When an "unknown" appears upon any one or more of the system's scopes, an alarm is flashed via "White Alice" that alerts the entire network. Speedy F-102s or F-89s are "scrambled" to have a look.

In turn, a single "hot line" phone call from AAC Headquarters at Elmendorf AFB to the NORAD nerve center at Colorado Springs would serve to galvanize defense machinery throughout North America.

Like a castle on the Rhine is this lonely Dew line outpost in the Aleutians. Left of site butte, is temporary construc[illegible]p wh

We lurch to a stop near the Cold Bay runway. Our Gooney is refueled and waiting; the crew is aboard. Soon we are darting through the overcast, bound for Unimak Island and the Dew line site at Cape Sarichef.

Now, miraculously, our luck changes. We burst from flannel colored murk into brilliant sunlight. In the seat beside me a graying civilian engineer grins. He is Mr. Hal Abrams, Chief of AAC's Contract Review and Liaison Division, Directorate of Installations.

"You know what they say," he cracked, "if you don't like the weather in the Aleutians, wait five minutes. It's bound to change."

Suddenly we swoop lower across Unimak's tundra plains. I press my nose to the window. Below, scampering from the sound of our engines, is a trio of enormous brown bears. Farther on we sight a dozen more, some trailed by half-grown cubs obviously puzzled at all the fuss.

Someone hands me a pair of field glasses. The "brownies" turn out to be near-record specimens. I wonder at the consequences of a forced landing in this bear hunter's paradise.

Cape Sarichef, at Unimak's westernmost end, appears marooned in a wilderness of lakes and canals. From the air it resembles a pint-sized castle, but the radome spoils the illusion. We thunder past without landing. Next stop: Driftwood Bay.

On the way Captain Jewell confides that Driftwood's landing strip is considered one of Alaska's "hairiest."

We turn from off the sea, dart toward a narrow valley entrance. I sight the runway, a short charcoal slash at the base of a towering hill on our right. On our left and dead ahead are more hills. The valley is completely boxed, the only exit behind us.

Suddenly we are doing a wing-tip hand stand. With a bush pilot's skill and confidence. Captain Jewell blends his downwind, base, and approach legs into a diving, roller-coaster turn. The Gooney Bird slows abruptly.

Now we are barely airborne, toboggan-skimming down tundra slopes. No one speaks. The construction camp, a village of nondescript shacks, swims past my window. We continue to sink.

Gravel beneath us now, a curving line of surf ahead. Unconsciously, I cross my fingers.

A lifetime later, rubber and rock make contact. Brakes squeal. Once, twice, three times our seat belts take the strain.

Then we are stopped. I look out. There is room to spare.

Driftwood Bay, on Unalaska Island, is by all odds the most scenic of AAC's half-dozen Dew line sites along the chain. Ringed with skyscraper bluffs, it is a still-life of greens and reds, criss-crossed with the silver and white of streams and snow. Some three dozen Air Force men will call it "home."

The site itself occupies a red earth bench on the Siberia side. From this thousand-foot high eyrie, Driftwood's revolving antenna scans a vast amount of Aleutian airspace.

As we disembark at the Morrison-Knudsen Company campsite Captain Jewell is spouting figures like a Univac. I learn that the dollar value of AAC's Aleutian Dew line program totals approximately $47 million. Construction costs will eventually total $22 million; $25 million will be spent on technical equipment and installation.

Overall guidance is being supplied by an Air Force Dew line project office in New York. Air Materiel Command is the installation and engineering agency. In January 1957, the Western Electric Company was named prime contractor. Construction began in April that same year.

"Project Stretchout" is a singularly appropriate nickname. At its westernmost point, our eventual destination, the system links Alaska's mainland warning system with Navy picket ships and aircraft operating between the Aleutians and a number of Pacific outposts.

AAC's 10th Air Division, with headquarters at Elmendorf AFB, is the agency charged with Dew line manning, maintenance, and operation.

At Driftwood Bay I finally get a close-up look at the revolutionary radome that hallmarks Aleutian Dew line sites. Made of incredibly tough plastic, it is an engineering masterpiece.

Unlike mainland radar stations, which feature one-piece inflated rubber "envelopes," island radomes are built of diamond-shaped plastic pieces erected individually. Tier upon four-foot tier they are bolted together. When joined at the apex the whole is literally stronger than steel.

On several occasions high winds—in excess of 120 m.p.h.—have snapped retaining bolts without damaging the plastic shells. Hurricane winds have thus far failed to elongate a single bolt hole.

Inside the Driftwood dome, Captain Jewell leans on

onstruc[illegible]mp which housed 100 men.

An Alaskan Air Command C-47 resembles a model airplane against backdrop of towering cliffs which rise on three sides of runway at Driftwood Bay. At left are quonset huts used by the site's building contractor. A road, constructed from volcanic ash, leads from runway to the site.

A far cry from the average GI bunk are these three-quarter beds featured at the Nikolski site. Sergeant Doherty puts his stamp of approval on the downy innerspring mattress in a typical bedroom for airmen.

the giant antenna. Its barred aluminum screen curves above us in a multi-colored gloom caused by sunlight on the plastic overhead.

"This gadget weighs a little more than three tons," the captain informs me, "and is the largest single piece of equipment in the building."

With the palm of his hand he gives the mechanism a light shove. It spins silently around its axis.

Living quarters at Driftwood Bay would do credit to many a first class stateside hotel. Furnishings are blonde modern—closet space more than ample. Two men will share a room.

Our inspection party is not so fortunate. We spend the night in a leaky Jamesway Hut belonging to the Morrison-Knudsen Company—one of the world's foremost building firms and the site contractor at Driftwood Bay.

M-K's logging camp chow, however, leaves no room for complaint. Next morning, after a Bunyanesque breakfast, we enplane for the Dew line's western terminus at Nikolski.

Now the balmy weather deserts us. Before takeoff Captain Jewell cocks a mournful eye at the lowering Aleutian ceiling.

"Keep your Mae Wests handy and your seat belts fastened," he says, with a grin that strikes me as somewhat forced. "We'll be right off the deck from here on in."

For the next 10 minutes I listen to the sound of engines being run up. Then we are airborne. At 500 feet we level out, an arm's length beneath the overcast. Until we land at Nikolski an hour and 30 minutes later, my eyes are riveted on the wind checkered sea below.

Prime contractor for the four and one-half million dollar site at Nikolski, is Baker and Ford Construction Company, of Bellingham, Wash. Project superintendent is Mr. W. R. Huntington.

We are met at the plane by this likeable northland giant, who looks like a Notre Dame blocking back grown to manhood. He is proud of the fact that Nikolski was the last site begun and one of the first to be completed. After an hour on this moonscape island I deem his pride justifiable.

Located 900 air miles southwest of Anchorage, Nikolski is windy, wet, and out-of-the-way. Until now, its only full-time inhabitants were residents of a tiny Aleut Indian village not far from the site. Umnak lays claim to some of the world's most disagreeable weather. And Dick Huntington can testify it is no idle boast. He is currently chief "williwaw" battler along the chain.

Williwaws, born where warm air above the Japanese current collides with super-cooled Arctic air masses drifting southward from the Pole, are vicious windstorms that arise with frequent and terrible suddenness to rake the Aleutians.

During winter months, winds with gusts upwards of 120 m.p.h. are not uncommon. Temporary construction camp quarters suffer accordingly. Despite precautions, buildings are de-roofed with distressing frequency, stacks of forms peel off like decks of cards before lashings can be secured.

A 40-knot gale is blowing as we grind to a stop before Huntington's plywood dormitory, a 10-minute truck ride from the Nikolski landing strip. With a shrug, the "super" dismisses the wind as a "mere zephyr." Inside, over a mug of steaming coffee, he gives us the real lowdown on tribulations which beset island builders.

They began from the moment survey crews first stepped ashore in April, 1957. A portent of things to come was the full-blown williwaw which greeted them on the beach.

Working with transits and levels proved an impossibility. Bedraggled surveyors holed up with hospitable villagers until winds dropped to a "respectable" 40 to 50 m.p.h.

Huntington informs us laconically that "it's been more of the same ever since."

"Like Heinz," he says, "the Aleutians can serve up some 57 varieties of weather in a single day."

Williwaws notwithstanding, Foss Tug and Barge Company successfully landed the first building supplies shortly thereafter. Cement and lumber for warehouses came through undamaged, despite tricky currents in cold, wind-lashed seas. Heavy equipment, plus additional tons of material, followed immediately.

Construction was begun on the Nikolski airstrip. Soon a steady stream of cargo aircraft was shuttling between Anchorage and Umnak. Perishable foodstuffs to support the 200-man Baker and Ford campsite were flown in; supplies with a lesser priority came by water.

Within weeks Nikolski's skyline underwent a drastic change. Today, though the village remains the same, a particular butte rising from the water's edge a short distance away gives evidence of tiny Umnak's strategic importance.

Atop it sits the Nikolski Radar Station, an exact counterpart of four Aleutian Dew line installations nearer the mainland. Its floorplan, down to the last square of pastel linoleum is exactly the same. More important, however, its mission is also precisely similar; to alert the Nation against impending attack or invasion along the island airlanes.

And while this ability to detect at vast distances is commonplace today, it is no less a miracle. Nor is the fact the system could have been built at all—or one-half so well.

Starting from scratch, Americans, twice-blessed with dollars and ingenuity, have accomplished what a few fainthearted called "impossible" 24 months ago.

But to Dick Huntington, builder, the remarks of skeptics have habitually gone in one ear and out the other.

And to youthful Capt. Don Jewell, USAF, there was never any doubt; the Dew line was "just another job that had to be done."

Next morning, as our Gooney Bird roars off the runway and heads northeast for home, I take a last look at Nikolski's butte-bound radome, sticking up like a sore plastic thumb from its desolate surroundings.

Time, it would appear, has ceased to bypass the Aleutian Islands.

You should know

MIDGET MENACE

Air Force parents who buy their children a midget auto with the lawnmower-type engine should know that it can be as deadly as it is cute. Also once the putt-putt leaves the back yard in most states it is illegal.

Unsupervised use of the small autos is causing an increasing number of mishaps and much concern in many areas. It takes a real large back yard to let a child enjoy these new creations, but before you let yours take his hot-rod onto the sidewalks or streets check the local laws on power-driven vehicles. Your child's age, the lights of the vehicle, braking requirements, a license, and many other factors enter the picture.

ON GUARD!

If you're in SAC or you visit a SAC base you should know these security terms.

A *Covert Threat* means a possible enemy attempt to sabotage or block our alert force immediately prior to a surprise attack. This might be our first hint that such an attack was planned so rapid reporting of all suspicious events is essential.

Such a report causes a *Seven High* on SAC bases, putting everyone on guard.

Should prompt investigation reveal the likelihood of sabotage, a *Red Skin* report goes to SAC and puts the entire command into action.

To keep from accidentally triggering a *Seven High* on a SAC base don't enter a loaded aircraft or its bomb-bay alone. The *Two-Man Policy* prohibits any lone individual, regardless of rank or position, from having access to an assembled major weapon or large component of one.

DEAR JOHN

"I, Airman John Doe, will no longer be responsible for the bills of my wife, Lotsa Doe, 123 Easy Street, Anywhere, U.S.A."

Such a classified ad in the local newspaper does not nullify your legal obligation to support your wife. At least as long as you are married you must provide for the care and support of your wife and children, unless a court of law decides otherwise.

Domestic problems are best solved in conference with your base legal officer or civilian attorney.

DON'T BITE

American consumers spend an annual $250 billion plus—enough to satisfy the most ambitious salesmen. Yet there are still fast-buck artists, peddlers, and merchants who search for more than a "fair share" of business.

If you've been taken recently you probably: thought you could get something for nothing; thought you could buy at wholesale prices in a retail store; are bargain-wise and searched for the most sensational offer; didn't read or understand a contract; or thought you had a right to get a refund.

Be cautious of *bait ads* that include these danger signs: (1) you, your child, your house, your phone number has been specially selected; (2) made to sell for $7.50, now only $3.95; (3) earn $75 in your own home; (4) 100 percent financing or we carry our own loans; (5) such suspicious words as fantastic, amazing, one-in-a-life-time; (6) or those ads with the blackest type and the most exclamation marks.

In stores watch for the danger signs of such marking as *one-half to one-third off!* Off what? Comparative pricing is a degraded sales gimmick. Don't fall for "originally $75, now $37.50." The original price may have been marked up just to make you think you're getting big savings. Better stores everywhere are eliminating this comparative price advertising.

Another familiar shout is that of home food freezer plans. You think you can buy food at wholesale and for a few dollars more put a freezer in your home. This may be true but be careful—for the most part these companies are food dealers and the freezer is incidental to their primary product. Generally the monthly rates would more than pay for the food and the freezer if you purchased them outside a food plan.

A frequent intruder into your comfortable living room, a near-perfect place for pressure sales, is the photo salesman who got your child's name from one of the neighbors and suddenly decided he or she was selected to be photographed in some low-priced or "free" offer.

When buying a car or any other merchandise on a contract, it's a cardinal sin to sign blank forms and let the salesman make entries later.

My Job: PROTECTING AMERICA'S FREEDOMS

First Prize Winner, 1959 Freedoms Foundation Letter Writing Program for Members of the Armed Forces

To protect America's Freedoms, I have begun a crusade. I am, like a modern Paul Revere, embarked on a path of awakening and alerting. My job is to awaken the people of our nation to the ever-present dangers of complacency; to alert them to the safeguards they must erect for their protection. Today, everyone's a Minuteman! You alone can best protect yourself!

Though no bombs are dropping or shells bursting, we are at war! There is no great excitement or patriotic fervor, but the war is on! In this conflict each of us is the target and the victim. Though you may not realize it, you are struggling to survive even now. This is THE WAR TO WIN MEN'S MINDS!

Today, the Communists are fighting to dominate our minds, influence our decisions and gain control of our thoughts. Their clever and subtle efforts confront us on every hand. We see them in almost every newspaper, book, speech, movie, radio and TV program. They are deliberately tearing apart with their contradictions; yet we are seldom aware of this insidious, undermining of our personal freedoms. But this is no "Cold War." This is a dynamic, continuing, daily battle. If we lose this, we lose all!

In this war, our enemies are trying to change our emotional and practical alliances—tearing at the foundations of our family, church, and Constitutional Freedoms! They want to divide us against ourselves—belief against belief, color against color, and brother against brother! They are forcing us toward complying with their desires—to give up our freedoms, our way of life, and our very future! Thus, we will destroy ourselves!

Only a strong, moral and informed people can withstand such threats.

We can resist, as a people, only if we are convinced of the preciousness of our heritage and the infinite values of a way of life that guarantees "life, liberty, and the pursuit of happiness."

The answer lies within each of us. We hold within our hands the seeds of our enemies' destruction; our way of life! We have the most valuable and trusted weapons of all time: our Constitution, Bill of Rights and Declaration of Independence! Our enemies cannot tolerate their fruits without personal extinction. These are the tools of our defense.

The safeguards for your protection are simple. First, keep alert for the unobtrusive modifying of your thoughts—a change that can occur without your realizing, unless you maintain the vigil. Second, recognize the dangers from being lulled into an uncritical attitude toward your enemies' intentions and a critical view of your own way of life—by the continuing barrage of lies, distortions and innuendoes! Third, question everything you read or hear—by comparing it with the known facts! Fourth, set up a personal code of Absolute Standards and adhere to this God- and faith-based foundation for right and wrong! Finally keep faith with your country, your God and yourself! Thus, you will help me in my job of protecting America's Freedoms and, thereby, preserve your own.

RODNEY L. CRON, Major, USAF

Deterrence is Relative

The security of the United States is directly related to the adequacy and capability of its aerospace forces in comparison with the aerospace forces of unfriendly powers.

AFM 1-2